The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. XXXVIII. February 5, 1938 No. 971

The Anglo-American Trade Treaty

FOLLOWING upon the formal announcement last month of the American Secretary of State that it was the intention of the United States to negotiate a trade agreement with the United Kingdom and the expectation that actual negotiations with the British delegation would open towards the end of next April, it would perhaps be of interest to take stock of the position and summarise briefly the reasons for and against the conclusion of an agreement. The Board of Trade figures for last year showed that while very large increases had been made both in import and export trade during the period, the increased value of imports largely exceeded that of exports, with the result that there was a very substantial rise in the adverse balance of visible trade. The necessity of increasing our business overseas is thus self-apparent. During the past fortnight, chairmen of the great banks have unanimously spoken in favour of such means as international agreements in promoting foreign trade. To give an example, Mr. Colin Campbell, chairman of the National Provincial Bank, Ltd., said that it is true that some sections of industry are at present working at high pressure, but the importance of maintaining and increasing our export trade is so great that the need of markets overseas cannot be ignored. Further, M. van Zeeland's report (which is commented upon on page 107) on the possibility of obtaining a general reduction of obstacles to international trade attaches great importance to the negotiation of bi-lateral commercial agreements—agreements under which two countries make concessions to the trade of the other with a view to securing mutual benefits. Thus from the point of view of national economy, the advisability of concluding a trade agreement with the United States is obvious.

It is generally agreed that an international treaty, having the effect of increasing our export trade, is highly desirable. Accordingly, the majority of the critics of the scheme do not strike at this basic idea, but, while admitting the need for expansion of exports, doubt whether two essentially manufacturing countries, both producing almost every conceivable kind of goods, can possibly come to an agreement which will be of lasting benefit to each. Speaking at Leeds on January 28, Sir John Simon said that in spite of these difficulties a basis for negotiation had been found. He gave, however, no indication of the form which that basis might take. In order that there shall be any kind of basis at all, the United States must have been informed of certain concessions which this country is prepared to make. Industry has no hint of what these concessions might be. In November the Federation of British Industries asked the President of the Board of Trade to notify those industries at whose expense the U.S.A. might ask for concessions in the British market and to allow them to submit their views as to the repercussions which such concessions would have. Mr. Stanley replied, however, that he was unable to depart from the present procedure of H.M. Government in the matter, which was to confine consultation with industry to the question of the concessions which it was proposed to ask the U.S.A. to make. In a further recent letter to Mr. Stanley, Lord Hirst, President of the F.B.I., set forth the reasons why industry attribute so much importance to being consulted also as to possible concessions on their own tariff. There is no call to go closely into these reasons. It was clearly pointed out that there was a great necessity for close consultation between the Government and British industry on a matter affecting industrial interests so vitally. Moreover, it was stated, in view of the fact that negotiations are to take place in America where representatives of British industries will not be available for consultation, it would appear more than ever important that the fullest possible preliminary discussion with British industry of all the points likely to arise in the negotiations should take place. Incidentally, it seems unfortunate that the delegation appointed to undertake the negotiation contains neither business men nor industrialists in addition to the official representatives.

Last week saw the publication of a list of products, including many chemical substances, which will come under consideration for the possible granting of concessions by the U.S.A. The publication of such a list shows that American industry has collaborated with the government of that country and they are in agreement on the points which they are presenting for negotiation. Conditions are admittedly different in America from those in this country as regards the relation between government and industry; if the Government could take British industry more into its confidence than at present, considerable anxiety would be removed from the mind of the manufacturer and valuable assistance would undoubtedly be obtained in the attempt to draw up and conclude a treaty which would give the greatest satisfaction to both sides. In the case of all treaties there must be give and take on both sides. Although the treaty at present under consideration could obviously be of untold value to this country, it is difficult for British industrialists to remain tolerant and refrain from criticism. Even though they may be aware that the treaty, if satisfactorily concluded, will react for the ultimate good of industry, they realise that they will have to give, but do not know how much nor on what products they will be called upon to make sacrifices.

Notes and Comments

Peruvian Chemical Trade

PERU'S total trade has been expanding steadily since 1933, and since that year the country has enjoyed a persistently favourable trade balance, according to a report on the economic and commercial conditions in Peru issued by H.M. Stationery Office. The United Kingdom is easily Peru's best customer, our chief competitors being U.S.A., Germany, and Japan, but our trade has lost the pre-eminence it once held in this market. Total imports of chemicals from January to July, 1937, totalled 5,862 thousands of soles compared with 9,561 for the whole of the previous year, and 8,870 in 1935. Considerable competition with the United Kingdom is experienced from Germany in chemical and pharmaceutical products, cements, metals, textiles and colours. Among the chief Peruvian products exported to the United Kingdom are colours and chemical products. There are about 62 soap factories in Peru, using large quantities of local cotton-seed oil. The total annual production is about 18,000 tons besides special soaps, perfumes, etc. There are 15 factories producing patent medicines and six making heavy chemicals such as sulphuric acid, sodium carbonate, ether, oxygen and carbon dioxide. Most of the raw materials for the small paint-making industry are imported. The total annual production of alcohol is about 20 million litres which is mainly produced from sugar.

Annual Report of the D.S.I.R.

THE annual report of the Department of Scientific and Industrial Research always serves as a useful barometer of the progress of science applied to industry. This year, as seen from some of the outstanding points in the report published on pages 101-104, has seen further substantial progress. Progress has not been restricted solely to research carried out in the department itself, and in the various research associations, but the past year has witnessed a still more intimate contact with industry. This contact is a valuable feature of the department's work. In the case of the National Physical Laboratory, the charges made for special investigations have been reviewed and it is possible that they may be reduced. An important step has been taken in the arrangements made whereby the N.P.L. staff are enabled to visit works and carry out their investigations *in situ*; an innovation which should prove to be of particular value. Appreciation of the services of the research associations to the trades which they cover is shown by the increased financial support provided by industry. This form of co-operative research carried out by the associations for the benefit of the subscribing industrial firms is profitable work which is steadily developing in scope.

The Purity of Water

THE leader in THE CHEMICAL AGE of December 4 last gave a short description of the numerous sources of contamination to which water is exposed from its precipitation to the final stage of consumption. It is evident from this account that considerable scientific ingenuity must be applied to the purification of water if the product is to reach the public in a completely untainted condition. In spite of these sources of contamination and the subsequent necessity for careful purification, however, it is remarkable that there is no legally defined standard of purity for water supplies. Even more remarkable, as the inquiry into the recent typhoid epidemic has revealed, is that the Ministry of Health does not have the power to enforce the installation of purification and sterilising plant nor the daily testing of water supplied for domestic purposes. In a letter to the Minister of Health, the British Association of Chemists expresses its grave concern at these conditions. It is pointed out that the Ministry's statistics show that there are over two thousand different water suppliers and that there is no official check as to the quality or suitability of the water supplied nor is there any insistence that those who supply water for this important service should maintain efficient laboratories and staff for the proper testing of the supply. The Association feels that the Ministry should be empowered to order that every water company in the country should have the resident services of sufficient chemists to ensure the maintenance of a suitable standard of purity. The Association should be highly commended for taking this action which might result in expansion of the chemist's activities. But it should not be overlooked that the bacteriological assay of water is as important as chemical testing. Few chemists can undertake the assay satisfactorily without special training and experience.

Expanding Work of the Imperial Institute

ALMOST important part of the work of the Imperial Institute is the examination of samples submitted from Empire countries in order that the commercial possibilities of the product in the British market might be determined. The examination is conducted by two departments of the Institute, Mineral Resources and Plant and Animal Products, both in the laboratory and through commercial inquiry. The annual report of the Institute for 1937 records further expansion in the forging of these economic links between the countries of the Empire. The advisory technical committees on minerals have been reorganised and renamed; these now number seven and include consultative committees on precious metals, base metals, coal and petroleum, iron and ferro-alloy metals, and chemical industries. The number of technical inquiries dealt with by the Mineral Resources Department continued to rise during the year, the total of 1,101 representing an increase of nearly 19 per cent. over that of 1936. Laboratory investigations involved the examination of 317 samples from 30 countries.

Co-operation Between Maker and User

IN many manufacturing industries, it is essential that the purchaser be furnished with details of the method of application of the goods supplied. This is not only necessary to ensure that the goods are not considered faulty, when it is actually the application technique that is in error, but the customer can sometimes suggest modifications in the product to meet special conditions of application and where the recommended technique has appeared to fail. W. E. Cone, in a paper on thin tar carpets presented to a meeting of the Institute of Quarrying at Bristol, emphasised the need for technical co-ordination between the scientist, engineer, and the manufacturers of road-making materials. By such means problems can be viewed from many different angles, and a clearer understanding obtained of the influence which the best manufacturing and constructional methods exert on the results to be achieved on the road. In many branches of the chemical industry also, the same co-operation between the manufacturer and user is just as beneficial. Technical service departments form a valuable connection with the customer whereby advantageous co-operation may be obtained.

Science and Industry

Substantial Progress in the Work of the Department of Scientific and Industrial Research

THE annual report of the Department of Scientific and Industrial Research for 1936/37 (Stationery Office, 3s. net) opens with a tribute to the late Lord Rutherford and his inspiring leadership during the seven years he was chairman of the Department's advisory council. The reports which have appeared annually over his signature during that period all bear testimony to the strength of his conviction that the prosperity of this country can only be assured if its industries make the fullest use of the technique and the discoveries of science. His last act as chairman was the shaping of the present report which is signed by Lord Riverdale, the new chairman of the council.

During the year consideration has been given to two directions in which it may be possible to strengthen the contacts between industry and the National Physical Laboratory. With improved conditions of industry the basis of the charges made for special investigations and tests have been reviewed, and it is anticipated that some reduction of the charges may be possible in particular cases. Arrangements have also been made by which the N.P.L. staff will be available to visit works to study practical problems of production and to plan investigations and carry them out on suitable terms under the conditions obtaining in manufacturing practice. This new development is one which should prove attractive to industry.

The present report records substantial progress in practically all directions of the Department's work, both in the researches carried out by the research establishments of the Department itself, and in the laboratories of the research associations.

The scale of operations of the research associations continues to develop. This is true not only financially, but also of the contacts made between the personnel of the associations and the technical staffs in the industries. This closer liaison with their member firms has been an important feature of the associations' activities of late years and is one which we heartily commend. Financial resources encouraged by the present conditions of grant, maintain the upward tendency referred to in the last report. The aggregate income subscribed by industry has now practically reached £250,000, and the Government's grants nearly half that amount. During the past year the Pottery Manufacturers' Federation decided that the time was opportune for the setting up of a research association for their industry. To finance this project the Federation has guaranteed the new research association an income of at least £10,000 per annum for five years, and the Department has agreed to make a grant of £5,000 a year.

Investigations of Water Pollution

The report of the survey of the river Tees is a notable contribution to knowledge. The survey is so detailed and has been so carefully carried out that its conclusions are authoritative and will constitute a standard of reference. The immediate cause of the establishment of the Water Pollution Research Board was the concern occasioned by several instances of drastic pollution of rivers and streams through the discharge of large volumes of obnoxious liquids from newly erected beet-sugar factories. The result of the Board's work, carried out with financial support from the industry, shows not only how polluting factors might be removed from the effluent, but how the effluent itself could be avoided. An allied problem, that of the treatment and disposal of waste waters from the milk industry, also demanded urgent attention, and has proved as successful as that on beet-sugar effluent. The application of some of the results to the general problem of sewage disposal, is now engaging the Board's consideration.

The public supply of pure water for domestic purposes has its own problems; one is that of softening. Here, work carried out for the Board at the Chemical Research Laboratory has made useful contributions. What is known as the base-exchange method of softening depends on the properties of certain hydrated aluminosilicates. Under suitable conditions the base combined with the aluminosilicate radical can be replaced by other bases, and the process is reversible. Thus, when hard water is passed through a column of suitably graded particles of the sodium compound of the aluminosilicate, the calcium and magnesium in the water change places with the sodium in the compound, and the water is softened. When the softening powers of the compound are exhausted they can be restored by a reverse exchange, using brine.

The investigation of the problem has included the study of many British clays which may provide suitable softening materials; and from some of them materials have been produced with a base-exchange value equal to that of treated clays that are now imported, and with greater resistance to disintegration. From this work also there has resulted the discovery of properties in certain synthetic resins which are most promising. For example, two resins have been produced by which the solids in solution in the water supply of Teddington can be reduced to about one-thirtieth of their original amount; and the treated water is practically equivalent to distilled water.

Metallurgical Research

At the National Physical Laboratory the preparation and study of metals and alloys of the highest possible purity has been continued. The chemical method evolved for the preparation of pure iron has proved so satisfactory that a plant has been installed capable of producing sufficient quantities of the metal for the research in progress. Progress has been made with the investigation of the alloys of iron and manganese, particular attention having been given to the alloys near the iron end of the series, in which a phase change occurs at about 200° C. The solubility of iron sulphide in solid iron is being determined by thermal and microscopical methods, including the effect of adding small quantities of manganese and other metals.

Research on the mode of deformation of materials has been continued by the Metallurgy Research Board, and a number of creep tests and short-time tensile tests have been conducted *in vacuo* on specimens of pure iron specially prepared for the purpose. The effect of carbon content on the manner of creep of carbon steels is also being studied. In short-time tensile tests, between 15° C. and 650° C., the addition of carbon up to 1.1 per cent. increases the strength of the steels, although in long-time tests susceptibility to graphitisation is shown to be an important factor in determining their resistance to creep. The mode of creep in carbon steels in the austenitic range of temperature is also being studied and it is noted that at 950° C. the carbon content appears to have little effect on the tensile strength. Further tests have been made on the nickel-silicon-copper alloy used in connection with the investigation of the effect of age-hardening on creep. "Duralumin," an age-hardening light alloy, is also being tested.

The work on magnesium alloys which has been carried out in the past has taken the form of a general survey of many alloy systems to find out if they gave rise to alloys having promising mechanical properties. As stated last year alloys containing silver and aluminium, and alloys containing cerium and calcium, appeared very promising. More detailed work has now been carried out on these alloys, and it is found that the addition of cobalt greatly improves the mechanical properties of the cerium-magnesium alloys at high temperature. An alloy containing cerium 1 per cent., cobalt 1.5 per

cent. and manganese 1.5 per cent. has a tensile strength of 7.4 tons per sq. in. at 300° C.

In the research in progress on age-hardening a paper on the effect of small percentages of silicon and iron on the constitution and age-hardening of an aluminium alloy containing 4 per cent. copper has been published. (*J. Inst. Metals*, 1937, *60*, 75). The study included alloys containing up to 0.6 per cent. iron and 1 per cent. silicon independently or together. The addition of 0.1 per cent. iron inhibits ageing at room temperature, but not at higher temperatures, while the addition of 0.6 per cent. iron reduces, to a marked degree, ageing at higher temperatures, a behaviour which is not affected by additions of silicon up to 1.0 per cent. From a study of the constitution of alloys it would appear that the age-hardening which takes place at high temperatures may be attributed to the precipitation of silicon as well as some $CuAl_2$ from the solid solution.

Following the completion of the investigation on tantalum-iron alloys and tantalum-niobium steels (referred to in the last annual report) a further series of steels made from ferro-niobium low in tantalum has been found to possess similar properties except that some of the niobium steels appeared to nitride more readily than those containing tantalum. A series of iron-niobium alloys containing up to 13 per cent. of niobium has been made from electrolytic iron and metallic niobium.

A large amount of work on iron and steel has been carried out both at the National Physical Laboratory and under the Iron and Steel Industrial Research Council of the British Iron and Steel Federation. The British Non-Ferrous Metals Research Association has fifteen major researches in progress.

Chemical Research

A report describing in detail the work of the Chemistry Research Board for the three years to December 31, 1937, will be published shortly.

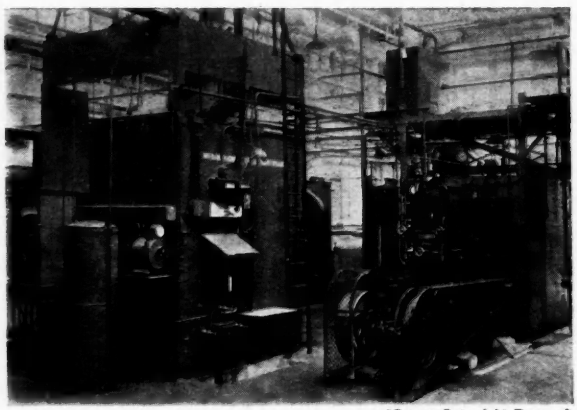
The influence of air-movement on the rate of corrosion of iron has been investigated in relation to the composition of the air. In stagnant conditions the repressive effect of carbon dioxide has been demonstrated both for unsaturated atmospheres and atmospheres intermittently reaching saturation, and both in the absence and presence of traces of sulphur dioxide.

Carbon monoxide under high pressure as a carboxylating agent for aliphatic compounds has been applied to ketones and, in presence of phosphoric acid at 200°, both acetone and mesityl oxide are converted into a mixture of acetic and trimethylacetic acids. Methyl ethyl ketone leads to a more complex mixture consisting of acetic, propionic, 1 : 1-dimethylbutyric and 1 : 1-dimethylvaleric acids. If nitrogen or hydrogen is employed in place of carbon monoxide, acetone gives a mixture of acetic acid and unsaturated hydrocarbons. The latter probably contain di- and tri-*iso*-butylene, but tests on this material do not indicate any outstanding value as a fuel of high octane number.

Further investigations on the catalytic production of higher from lower alcohols have indicated that ethanol gives in general unbranched chain higher alcohols and both *n*-hexanol and *n*-octanol have been identified. *n*-Propanol gives mainly 2-methyl pentanol, but in the presence of carbon monoxide some *iso*-butanol is produced.

The action of caustic soda solution on regenerated ulmins furnishes an ether-soluble product which is composed of phenolic, acidic and neutral constituents, the last-named containing elemental sulphur and a wax melting at 62° C. Chlorination of these ulmins up to 25.0 per cent. has been effected by treatment of an aqueous colloidal dispersion with the halogen but only part of the attached chlorine is removable by caustic soda solution. Coal dispersed in oil has been successfully hydrogenated in the absence of added catalysts, under high pressure and conditions of turbulent flow.

A series of hydrocarbons, isolated from anthracene oil has been shown to include phenanthrene, pyrene, fluorene, anthracene, fluoranthene, chrysene, naphthacene with traces of



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Turbulent flow plant for high pressure reactions at the Chemical Research Laboratory, Teddington. (D.S.I.R.)

β-methylanthracene and carbazole. A detailed study of pyrene and naphthalene homologues and of their hydrogenated derivatives is in progress.

An investigation is in progress involving the condensation of picryl chloride or a derivative such as methylpicryl or dimethylpicryl chloride with amines of the pyridine and quinoline series and having for its object the preparation from these picryl derivatives of new heterocyclic systems likely to be utilisable in chemotherapy. In further extension of the group of compounds of type-$AsO_3H_2.C_6H_4.NH.CO.[CH_2]_n.CO.NR_1R_2$ an oxalyl series of compounds ($n = 0$) has now been prepared. These compounds are trypanocidally active, but in general they are much more toxic than their homologues in the malonyl ($n = 1$) and succinyl ($n = 2$) series. A series of compounds where $n = 16$ is also being investigated. Several compounds of general formula. $AsO_3H_2.C_6H_4.CH_2.CO.NR_1R_2$ have been prepared and found to be trypanocidally active.

Synthetic Resins

Oil-soluble phenolic resins, similar to those discussed in the Director's presidential address to the Institute of the Plastics Industry (*Trans. Inst. Plastics Ind.*, 1937, *6*, 41) have been shown to possess low molecular weights of about 300. Certain of their crystalline constituents, together with other resinous intermediates, have been examined. In the preparation of colourless resins, various dehydrating catalysts, other than iodine, for *iso*propenyl methyl ketone (methylene methyl ethyl ketone), have been investigated. The effect of certain carbonyl compounds on rate of polymerisation of this ketone and on water absorption and Brinell hardness of the polymeride, has been determined.(*ibid.*) Additional light has been thrown on the mechanism of condensation by isolation of intermediate compounds. (*J. Chem. Soc.*, 1937, 841).

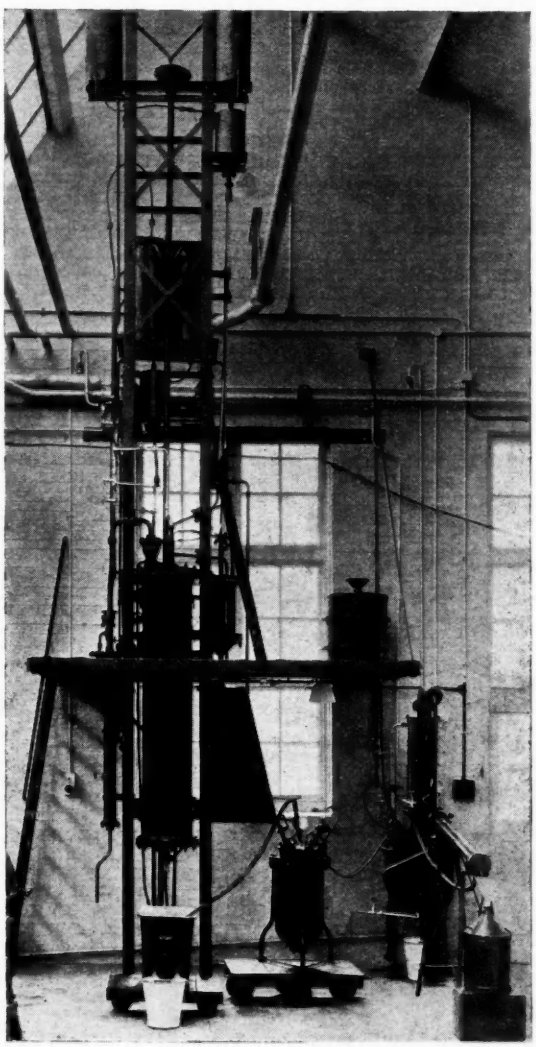
New flue dusts have been examined but none of them contained any exceptional amounts of germanium or gallium. Some attempts have been made to extract or concentrate these elements by methods other than those previously employed; flotation methods and extraction with alkali sulphide, however, have been only partially successful. A study has been completed of all the known procedures for estimating germanium and some modifications have been suggested. Investigations on the complex salts of ruthenium, osmium and iridium have been continued.

In researches on the polypyridyls it has been found that dehydrogenation of 2 : 2′-dipyridyl, 4 : 4′-dipyridyl and 3 : 4′-dipyridyl with iodine leads to a group of tetrapyridyls (*bis*dipyridyls) whereas with 2 :2′2″-tripyridyl, a hexapyridyl (*bis* 2 :2′ :2″-tripyridyl) is formed. The new bases and their metallic derivatives are under examination. The work on phenanthridine has been extended to include derivatives of 9-phenyl-phenanthridine, which contain two amino-groups. Such compounds, which are isomeric with the well-known

acridine dye, phosphine, have marked antiseptic properties; of more importance is the fact that certain of them are promising trypanocidal agents.

A substantial part of the activity of the Paint Research Station is now concerned with research on paint application problems, and a year is a short time in which to expect any outstanding conclusions. Nevertheless, progress has been made in each of the three main sections (dealing with woods, plasters and the like, and metals), into which the work is conveniently divided.

Certain woods, particularly those of Empire origin, such as British Columbian Pine, are generally considered to present special painting difficulties. As a part of the examination of this problem, a series of exposure tests has been commenced at Teddington, and duplicated in various parts of the country in localities providing industrial, urban, rural and marine atmospheres, in order to study the effect of such wood variables as direction of cutting, relative behaviour of hard and soft grain, etc., on various representative painting



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Semi-scale plant at the Chemical Research Laboratory for the extraction of aqueous solutions by ether.

systems. The protection of metals, particularly iron and steel, by means of paint, and methods of handling the corrosion problem, form another section of the work, recorded data on the preparation of metal surfaces for painting and on the selection and application of paint materials to metals having been surveyed in the light of experience.

Last year has been one of great activity in all departments of the Shirley Institute, the headquarters of the Cotton Research Association. It has now been decided to install a representative range of finishing machines for scouring, bleaching and dyeing, in order that some of the vast amount of fundamental research work on finishing problems, the results of which have been accumulated, may be applied more directly to the trade's special problems. Hitherto the association has concentrated mainly on improving the properties of the materials used in industry and increasing the quality of the products made by it with existing equipment.

Efforts are being made to secure extended and more stable support from industry for the work of the Wool Industries Research Association. A proposal seeking to obtain agreement in the various branches of the industry for the raising of funds by means of a statutory levy, while obtaining substantial backing from trade federations and individual firms, failed to gain the necessary majority opinion. Recourse has, therefore, had to be made for immediate purposes to an appeal for increased voluntary support, the results of which are still awaited.

Considerable attention is being given to the chemical treatment of wool to reduce shrinkage. With all the methods used there is the danger of over-treatment, which produces a harsh handle in the wool and a deterioration of resistance to wear. Laboratory technique has been developed which has proved of great value in determining the modifications produced in wool by various treatments. The method is useful not only for the control of treatment, but gives information as to the sort of treatment an unknown sample of fabric has received. The technical advantages of various treatments depend both on their cost and on the accuracy of the control which can be exercised. In most " wet " treatments, if over-treatment is to be avoided, it is only possible to give a partial treatment to yarn fabrics. Thereby, only the fibres on the outside of the yarns are attacked, which produces only a temporary effect in reducing shrinkage, since on washing, the yarn fibres are disturbed and the untreated fibres at the core then become capable of producing felting.

Rubberised Wool

In co-operation with the Rubber Growers' Association, research is being carried out on the use of rubber in conjunction with wool. By the use of suitable agents, the report continues, rubber can be deposited from latex on the surface of the individual fibres of a yarn fabric or felt much in the manner of a dyestuff, absorption proceeding until the solution is exhausted. One of the applications of this principle is that yarns can be rubber-treated in hank form as in a dye bath. The material so prepared has increased strength and resistance to abrasion. The process has been made the subject of patent applications which, it is hoped, will be developed commercially in various ways.

The British Leather Manufacturers' Research Association has continued to devote a considerable amount of time to extra-mural research, which is being undertaken in co-operation with the members. The work includes experiments on the best methods of curing and storing market hides. These experiments were commenced a year ago, and the results of the tests should shortly become available. Another extra-mural research is concerned with the soaking of dry hides in water sterilised by the addition of various disinfectants of the chlorine and phenol types. Large experiments dealing with belting leathers, and the effect of the incorporation of oil and grease in leather, which have been in progress during the last five years, have led to the general conclusion that the main effect of greasing leather is a physical one, bringing about changes which give increased flexibility and tensile strength, and that chemical changes during this process are incidental.

Changes in the properties of vulcanised rubber with age have been extensively studied by the Research Association of British Rubber Manufacturers because they form one of the limitations to the use of rubber articles. Owing to the extreme slowness with which ageing changes may take place, accelerated tests are needed to indicate the probable life of

rubber products. It is easy to devise accelerated tests, but these are of little value unless their effects can be correlated with those of natural ageing.

Two recent developments in rubber technology have given great practical importance to the somewhat abstruse subject of whiteness measurement. In the first place, rubber latex, a white or nearly white liquid, is now being increasingly used for the direct manufacture of rubber goods and for many other purposes, and consequently whiteness has become an important characteristic in the marketing of latex. In the second place, the extensive use of white or brightly coloured rubbers has necessitated a great deal of work on white pigments, which involves comparing the " whiteness " of rubbers containing them. Various instruments used for measuring colour and whiteness, chiefly to determine their suitability for testing latex, have been examined.

In view of the extensive use, actual or potential, of rubber floor-covering materials, a representative collection of such materials has been examined so as to enable a British Standard Specification for rubber flooring to be prepared.

Recovery of Photographic Silver

Continuous Electrolysis of Used " Hypo "

ALTHOUGH the recovery of silver from used " hypo " (sodium thiosulphate) fixing baths has been carried out for some time, it has not been possible to remove the silver and thus regenerate the solution while the latter is in use in a closed circuit. This has now been made possible as the result of experiments which Eastman have been carrying out, an electrolytic method being employed.

Ordinarily when an electroplating current is passed through a thiosulphate solution containing silver, a black cloud of silver sulphide is liberated at the cathode. Only when the current is reduced to about 50 mA per sq. ft. is silver deposited, and then only very slowly. This could be ascribed to the fact that the silver in the solution is carried by negative ions, which also carry cyanide, and the silver remains in solution. The silver deposited under the new conditions is secondary silver, and conditions can be somewhat improved by a stirring of the bath.

Another problem is that of dirt in the solution. If any particles of dirt should be positively charged, these will be deposited on the cathode and will form substantial nodules for the deposits of silver, but will also form spots at which the effect of the agitation will be lost. To avoid this, the solution must be filtered before electrolysis. The silver will then be deposited as crystals. The small quantity of gelatine in the used baths will retard a crystalline formation, and will produce a very acceptable silver surface. Too much gelatine in the bath, however, will result in a thick layer of gelatine, which spoils plating effect. To prevent this an antidote in the form of any one of a series of organic sulphur bodies with the activating group $S = C\langle^{NHX}_{Y}$ is used. These are added in the proportion of 1 to 100,000 parts of the solution and permit higher gelatine concentrations.

The system used for the regeneration of the hypo on these lines comprises a paraffin impregnated wooden box, housing a number of compartments, which consist of an anode and a cathode slotted to straddle a shaft. The anodes are of graphite and made in four pieces; they slide into slots cut in the sides and bottom of the box. The cathodes are of Allegheny metal and are similarly installed. Running the full length of the box is an agitator consisting of a rubber-coated shaft with 16 sets of four radial paddles. As this shaft revolves, it creates a centrifugal action near its centre. This sucks up hypo out of standpipes which open just below the shaft, the feed to the standpipes being from filter cells placed at the sides of the box. These cells contain felt filter bags into which the hypo is filled and into which the excess hypo flows from the plating compartment.

Proper circulation of the liquid is obtained by causing the solution to filter from one end of the box to the other. The silver content will thus decrease, with consequent necessity for decreasing the current intensity. This is done by connecting the successive cathodes through adjustable resistances The filter bags are cleaned, whenever they seem to become clogged, by washing in water. The cathode plates are stripped of their silver from time to time; most of the silver can be removed by a gentle bending of the electrode.

New Dyestuffs

An Addition to the Group of Chlorine Fast Blues

FOUR new dyestuffs are announced by Imperial Chemical Industries, Ltd. Caledon Ming Blue XS is an important addition to the group of chlorine fast blues. It is easily reduced to a very soluble leuco compound possessing very good affinity and level dyeing properties when applied to vegetable fibres and is therefore suitable for application in the various types of circulating machines, jigs and open becks. It produces on cotton a greenish blue shade of very good-excellent fastness to open kier-boiling, chemick and bleaching and is of great value for the dyeing of yarns for shirting, fancy towelling and similar type fabrics where a high standard of fastness to coloured goods bleaching or repeated laundry treatment is required. It should be noted that the resistance to alkali boiling is greatly increased by the addition of Resist Salt L to the liquor (2½ lb. per 100 gallons). It withstands the Trubenising process and is of added interest to the shirting trade on this acount. When applied to cotton-viscose and cotton-silk union materials it should be noted that redder shades are produced on viscose and silk than on cotton.

Solochrome Blacks RCG and RCR are of a similar type to the older brands Solochrome Blacks RN and RC and are suitable for all purposes where the latter have found employment. They are, however, specially designed for the dyeing of worsted piece goods containing cotton or viscose effect threads, which are reserved to give an excellent white. They are, therefore, particularly suitable for the dyeing of striped cloths for men's wear and by virtue of their good appearance in artificial light are of great value for the dyeing of dress suitings. By the use of the two brands in admixture, practically all shades of black can be produced.

Chlorazol Diazo Bordeaux 2BS possesses very good dyeing properties on cotton and viscose rayon and, when diazotised and developed with beta-naphthol, produces a bright bluish shade of bordeaux possessing very good fastness to washing and perspiration. It is of value for the dyeing of cotton and cotton--viscose linings and those materials where a high standard of fastness to washing is required. This product can be discharged to a good white with Formosul or alkaline Formosul (vat colour discharge pastes) and is therefore of particular interest for the dyeing of ground shades for subsequent discharge.

Bronzeless Blue 18310 is characterised by the absence of the reflected metallic bronze usually associated with iron blues when applied in cellulose or synthetic media. It is of interest to manufacturers of high class synthetic and cellulose finishes, particularly those supplying finishes for coachwork where the smallest trace of bronze is apt to give an inferior appearance to the finished article. It can be used in place of ordinary Prussian Blue in the manufacture of bright greens and clean tints.

MANUFACTURE of casein artificial wool by the Polana Co., at Pabianice, is expected to commence in about two months. A commission to consider plans for organising the production of the raw casein in Poland is being appointed by the Agricultural Co-operative Association.

Institute of Chemistry

Pass List for January Examinations, 1938

THE Institute of Chemistry announces that the following candidates passed the examination in general chemistry for the Associateship :—Bidgood, Eric (University College, Nottingham); Black, Robert Arthur (City Technical College, Liverpool); Bolton, Frank Monkman (College of Technology, Leeds); Collyer, Thomas Alan, B.Sc. (Lond.) (University College, London, and Battersea Polytechnic, London); Cross, Frank Baynham (The Polytechnic, Regent Street, London); Hullah, Ralph (Bradford Technical College); Langridge, Rodney Arthur, Ph.C. (Municipal College, Portsmouth, and Woolwich Polytechnic, London); Mackey, Donald Robert (West Ham Municipal College, and Sir John Cass Technical Institute, London); Magee, John Howarth (City Technical College, Liverpool); Middlebrook, William Robert (College of Technology, Leeds); Salter, John Clement Mitchell, B.Sc. (Lond.) (University College, and the Imperial College of Science, London); Shreir, Louis Lionel (Chelsea Polytechnic, London); Smith, Christopher Thomas Morley, B.Sc. (Lond.) (Municipal Technical College, Hull); Westwood, Joseph Vincent, B.Sc. (Lond.) (University College, Leicester); Woodall, George Henry (Central Technical College, Birmingham); and Woodhead, Charles Alfred Bevan (City Technical College, Liverpool).

Electroplating Shown Pictorially

A Novel Demonstration

THE mechanics of electroplating will be shown pictorially by Mr. W. M. Phillips at a meeting of the American Section of the Society of Chemical Industry, to be held jointly with the American Chemical Society, at the Chemists' Club in New York on February 11. Small glass tanks will be used in a projectoscope. These tanks will contain plating solutions, in which are suspended anodes and cathodes, magnified images being thrown on a silver screen. When a suitable direct current is applied to the anode and the cathode, the solution of the anodes will be visible simultaneously with the formation of metal on the cathodes. The depletion of metal in the solution at the cathode will also show quite clearly, and the amount of gas evolved will indicate the relative efficiency of the respective plating baths through behaviour on the anode and cathode. The elimination of pitting of nickel deposits by reduction of surface tension and by addition of suitable wetting agents will also be demonstrated. Another experiment is designed to show that the SO_4-ion alone in chromium plating is not effective until combined with chromium metal.

Magnesium Chloride in India

Further Protection to be Considered

THE Government of India has ordered the Indian Tariff Board to inquire into the magnesium chloride industry with a view to ascertain the need of protecting it. There are at present three factories in India which manufacture magnesium chloride, and their total production is about 9,000 tons per annum. Since protection was granted in 1931, India has been able to export magnesium chloride to the United Kingdom, under the Ottawa agreement, and to Holland and Scandinavia. In 1933 the protective duty was raised under the Safeguarding of Industries Act to meet competition from Japan. The only industry which could be affected by the protection extended to magnesium chloride was the textile industry, which was using the product for sizing. When the Tariff Board held an inquiry in 1929, it was stated by the representative of the textile industry that they had no objection to the grant of protection to the industry as the protection amounted to 0.0428 pie on a piece of cloth worth Rs. 5-10.

Dispersion of Pigments

The Case of Drying Oil Media

THE dispersion of pigments in drying oil media was dealt with by Dr. C. W. Price, B.Sc., Ph.D. (Liverpool), in an address to members of the Manchester Section of the Oil and Colour Chemists' Association at the January meeting.

The particle size of modern pigments was small enough for all paint purposes, said Dr. Price. The grinding process had really two objects :—(1) to separate the aggregate of pigment, and (2) to bring the medium into intimate contact with the pigment particles when they were so separated. Some pigments were notoriously difficult to disperse and the comparative failure of wetting agents to assist in this dispersing process was well known. It had long been the aim of paint chemists to produce some wetting agent to add to the paint medium in small quantities to reduce the grinding process.

Pre-treatment processes had been suggested as a means to get over the surface difficulty. What happened was that the pigment manufacturer did the work for the paint manufacturer; work which was intended to assist in grinding. Various claims had been made for pre-treatment processes by the pigment manufacturer, but this was only a matter of shifting the place where the work was done. When the pigment was ground and wetted by a medium this was only the beginning; means had to be found to prevent the pigment particles from flocculating. It might not always be desirable to obtain the maximum degree of dispersion in paint, but for this purpose the paint was considered to be perfectly dispersed, when each particle was separated from its neighbours, and so free to move from those particles in close proximity.

Successful paint making involves not only the initial wetting and separation of the pigment particles in the grinding or mixing operation, but also the establishment of a condition of pigment dispersion which remains unchanged (or is easily restored by simply stirring) after reasonably long periods of storage. It is believed that such stability is assured only when each pigment unit is protected from contact and coalescence with its neighbours by an associated envelope of the medium or some active component thereof.

Dispersion stability can therefore be regarded as resistance to pigment flocculation, and there is good evidence that it may be assessed by observing the behaviour of paint pastes in which the flocculating tendency is aggravated by extreme dilution with an inert solvent. For this purpose sedimentation analysis methods for the examination of flocculate size distribution in dilute pigment suspensions have been developed at the Paint Research Station, Teddington, as part of a fundamental investigation of wetting and related phenomena in paint systems. The aim has been to determine the part played in the dispersion of pigments by individual components of oil media, and there is evidence from numerous experiments that the protection of pigment particles in the manner visualised may arise in two distinct ways, according as the adsorbed layer consists of (a) long-chain, active (polar) molecules (*e.g.* fatty acids), strongly adsorbed on the pigment surface and orientated normally to it, or (b) molecules such as those derived from drying oil polymerides (as in a stand oil), not strongly polar in character, nor tightly held by adsorption at the pigment surface, but forming a tough, coherent skin around the particle. Such protection which under favourable circumstances is likely to be more highly developed than that under (a) is believed to be analogous to the stabilisation of solid particles in aqueous suspension by proteins (*e.g.* gold sols stabilised as gelatine).

Adsorption data indicate that both types of protective envelope are monomolecular in thickness, the pigment dispersion quality increasing to a limiting value when the layer is complete. The manner in which these conclusions have been reached was illustrated by the record of a series of experiments on the commonly used white pigments in media consisting of refined and polymerised linseed oil.

High Pressure Chemistry

Synthesis of Ammonia: Hydrogenation of Oils and Tars: Gasification of Coke: Oxidation and Polymerisation

THE synthesis of ammonia from its elements may still be regarded as the most outstanding achievement of high pressure chemistry, said Mr. R. Taylor in a lecture on "Modern Developments in High Pressure Chemistry," delivered before the Leeds Area Section of the Institute of Chemistry on January 17. Researches carried out during the development of this process, in connection with catalysts and promoter action and also the attack of hydrogen on steels under conditions of syntheses, were of fundamental importance. Progress made in the hydrogenation of coal and tars may be appreciated by comparing the original process of Bergius with the methods now employed at Billingham, where the plant embodies most of the modern developments in catalytic hydration in the liquid and vapour phase.

Hydrogenation of Oils and Tars

The hydrogenation of oils and tars has been made possible on an industrial scale by the discovery of catalysts that are not poisoned by sulphur, such as the oxides and sulphides of molybdenum and tungsten, while the hydrogenation of bituminous coals has been set on a practical basis by Imperial Chemical Industries, Ltd., who have found that compounds of tin, especially in conjunction with hydrochloric acid, act as most efficient catalysts in this process.

Detailed examination at the Fuel Research Station of spirit fractions obtained by pressure hydrogenation of low temperature tar has shown the effect of catalyst on the composition of the spirit. The spirit produced in the presence of pelleted molybdenum disulphide differs from that with ammonium molybdate supported on alumina gel in three important respects: (1) It contains a much higher proportion of saturated hydrocarbons; (2) the proportion of low boiling hydrocarbons is much higher; (3) the proportion of paraffins to naphthenes is much higher. It must be concluded that with pelleted molybdenum sulphide catalyst, paraffins have arisen through the cracking of naphthenes. Experiments on the hydrogenation cracking of pure compounds in the presence of supported ammonium molybdate catalysts showed the formation of paraffins to be very slight and then only simple hydrocarbons such as butane, pentane and hexane.

Gasification Processes

Dent, Blackburn and Millett, in their researches on the gasification processes for the production of gas suitable for general distribution, have carried out an investigation on the effect of hydrogen under pressure on gasification at high temperatures (4th Report of the Joint Research Committee of the Institution of Gas Engineers and Leeds University). In one set of experiments a 450°-500° C. coke, obtained from a strongly coking coal was heated to 800° both in nitrogen and in hydrogen under pressures varying from 1 to 100 atmospheres. In an atmosphere of nitrogen the coke gave off hydrogen and only a small percentage was gasified, whereas in presence of hydrogen under increased pressure, hydrogen was taken up to produce mainly methane. The higher the initial pressure the more hydrogen was used up and the greater was the amount of coke gasified. Thus, with pressures of 50 and 100 atmospheres of hydrogen, 62 per cent. and 72 per cent. respectively of the coke was converted to gas of high calorific value.

Research at Teddington on the production of alcohols from carbon monoxide and hydrogen has indicated how the composition of the synthetic alcohols is dependent on the kind of catalyst employed. When methyl alcohol-forming catalysts are impregnated with alkali, the reaction leads to the production of higher alcohols. It was found at Teddington that a catalyst prepared by the ignition of a mixture of chromium and magnesium nitrates gave substantially pure methanol, but the catalyst, prepared by precipitation with aqueous potassium hydroxide, gave at a much slower rate a product which contained appreciable amounts of higher alcohols. A systematic examination of the influence of various amounts of different alkalis showed that addition of lithium, sodium or potassium hydroxide diminished the yield of liquid product in proportion to the amount of alkali added.

The synthesis of acetic acid from carbon monoxide and methanol, which has also been investigated at Teddington, offers an alternative method of manufacture to the oxidation of acetaldehyde. The action of carbon monoxide under pressure on the higher alcohols in the presence of phosphoric acid has led to a number of interesting syntheses of higher aliphatic acids. The reactions that occur can be explained by the hypothesis that the formation of olefins is a step in the process and experiments with olefins, steam and carbon monoxide confirmed this view.

The effect of pressure on the oxidation of hydrocarbons has been studied at Imperial College and the stabilising effect of pressure has made it possible with short times of heating to obtain a high percentage of the hydrocarbon burnt as intermediate oxidation products.

Effect of Pressure on Reaction Velocity

The effect of very high pressures on the rate of chemical change in the liquid phase has been investigated both at Imperial College and by I.C.I. (Northwich). In investigations on reactions in solution different pressure effects were found according to the type of reaction involved. For a "normal" reaction, that is, a reaction in which the number of molecules reacting is approximately equal to the number of collisions with the required activation energy, there is a much smaller increase in reaction velocity with pressure than in the case of a "slow" reaction, that is, a reaction in which the number of molecules reacting is several powers of ten less than the number of collisions with the necessary activation energy. Thus in the "normal" reaction between sodium ethoxide and ethyl iodide in alcohol solution the velocity constant was 1.6 times greater under 3,000 kg./cm.^{2} pressure than under 1 atmosphere, twice this value under 5,000 kg./cm.^{2}, and three times the value under 12,000 kg./cm.^{2}. The reaction between pyridine and ethyl iodide in acetone is a slow reaction, and here the effect on the velocity constant was much more marked, its value being increased 7.2 times at 3,000 kg./cm.^{2}, 15.3 times at 5,000 kg./cm.^{2}, and 47.5 times at 8,500 kg./cm.^{2}. A most striking positive pressure effect is seen in the hydrolysis of ethyl oxalate. Under a pressure of 5,000 atmospheres and at 17° ethyl oxalate was hydrolysed to the extent of 50 per cent. in a day and the reaction was almost complete in a week.

One of the most interesting applications of pressure to chemical change has been in the polymerisation of olefinic bodies, since the constitution of the products of reaction are dependent on the degree of pressure employed. The solid resinous polymers are obtained from ethylene by subjecting to pressure of at least 1,200 atmospheres at a temperature of 100°-300°. Small amounts of oxygen assist the polymerisation. Thus ethylene containing 0.08 per cent. of oxygen is polymerised by passing it continuously through a reaction vessel containing a heating element at 230° while the walls of the reaction vessel are kept at under 100°. The solid polymers are negligibly soluble in cold organic solvents but may be dissolved in hot hydrocarbons such as benzene. The resins may be moulded, cast or extruded into silk-like threads of high strength. The conditions of polymerisation determine the molecular weight of the polymer, which in turn determines the tensile strength of the thread.

M. Van Zeeland's Report

Difficulties in the Path of Plans for the Revival of International Trade

THE commercial classes of Great Britain have read M. Van Zeeland's report with conflicting emotions. No task seems more urgent to them than that which he set out to examine, namely, the possibility of obtaining a general reduction of the obstacles to international trade. Many of his recommendations command their cordial assent, as they are based on the principle of freedom of trade and finance on which British industrial supremacy was built up.

When, however, M. Van Zeeland proposes an international bureau, leading to a five-power conference, to carry his proposals into effect, British opinion turns from the ideal to the real and finds all manner of formidable difficulties in the path. Still, it is all to the good that a responsible statesman should call the world's attention to the economic madness in which it has got involved, and should at the same time point the way of sanity. He asks, for example, that financial assistance should be given to the debtor countries in order to make it possible for them to scrap their currency restrictions and clearing arrangements, and thus play their full part in the economic life of the world.

He calls for a concerted attack on two serious obstacles to the revival of international trade—first, tariffs and indirect protection by administrative action, and secondly, quotas. He would suppress industrial quotas altogether, and greatly modify agricultural ones. He has an equally sensible plan to secure a mitigation of tariffs. In fact, he would like to see an all-round application of the principles which must be at the root of the present negotiations for an Anglo-American trade agreement, which he commends as a positive move in the right direction.

The greater part of M. Van Zeeland's programme would have been regarded as a commonplace by the orthodox economists of a past generation. It is no less necessary to the health of international trade in 1938, but the difficulties in the way of its successful accomplishments have been recently multiplied a hundredfold. The new gospel of national self-sufficiency, preached more particularly by Germany and Italy, is a barrier which in practice may be found extraordinarily difficult to get round. The doctrine of supplying a country's needs wholly from national sources not only threatens the exchange of commodities, but virtually forbids the provision of fresh capital by the more fortunate countries to the less.

Still, those who believe that the world will not be a fit place to live in, until the nations resume the utmost possible freedom of commercial co-operation, cannot stand idly by without proclaiming their faith In this spirit, M. Van Zeeland's report must be regarded as a hopeful portent and a summons to practical men in all countries to think out their problems afresh and to help in forming a public opinion which will eventually lead to permanent prosperity.

Some of the problems confronting M. Van Zeeland and those who share his general outlook have been illustrated in the last few days by the chairmen's speeches at the annual meetings of the larger British banks. Mr. McKenna seemed chiefly concerned to vindicate currency management as practised in this country since 1931. Such a theme would have been anathema to his predecessors at the Midland Bank, and could find no place in the full scheme of free international finance advocated by M. Van Zeeland.

A more hopeful note was struck by Lord Wardington at the Lloyds Bank meeting. He suggested that the word "economy" had lost its former meaning, and now signified "wise spending," which, from the local government point of view, often meant expenditure on whatever happened to be the current fashion. Every friend of economy will rejoice to think that a financier in Lord Wardington's position has raised his voice in warning against the extravagance which is the besetting sin not only of municipalities, but of most Government Departments.

Chemical Notes from Foreign Sources

Germany

THE RATES OF POLYMERISATION OF STYRENE (an important raw material for synthetic resins), dissolved in xylene, in a nitrogen atmosphere and in a vacuum have been compared by Breitenbach and Rudorfer (*Monatsh. Chem.*, 1937, 70, 37). In presence of nitrogen the reaction at first proceeds more rapidly, but after a certain period it proceeds at a slower rate than in vacuum.

A REMARKABLY LARGE NUMBER OF PRODUCTS for making cement and concrete impervious have been brought on the German market, according to *Technische Blätter* (1937, No. 39, p. 573). The bituminous emulsion sold under the name of Aristogen is applicable to moist concrete, rough-cast and fresh masonry and can be used without danger for proofing the interior of drinking water reservoirs and food silos. Another product of a bituminous character, Inertol 49, is specially recommended for the protection of concrete in underwater and underground foundations and also offers excellent protection against warm liquids. These insulating coatings can be applied either hot or cold and in consistencies ranging from a paste to a thin liquid. Gabritol is a black varnish suitable both for concrete foundations and for iron surfaces; Gabrit and Dursit have been specially developed for roof protection. Among the products on a non-bituminous basis may be mentioned Aquasen, a natural resin product resistant to alkalis, to nitrate efflorescences and to water; Pagit (chlorinated rubber base) with excellent chemical resistance; Alusole, an aluminium paint affording protection against temperature changes.

Poland

THE WARSAW MEAT INDUSTRY is sponsoring the establishment of a factory for making bone meal, glue and albumen from slaughter-house waste products.

Jugoslavia

STATE ASSISTANCE IS BEING PROVIDED for the exploitation of copper ore deposits by a Roumanian-Jugoslavian company (represented on the Roumanian side by the Phœnix Chemical Works, who are to erect a factory in Jugoslavia).

Japan

SYNTHETIC RUBBER MANUFACTURE will shortly be commenced by the Tokai Rubber Industry Co. (formerly trading as the Kamata Driving Belt Co.). The whole of the shares (which have been paid up to the value of 280,000 yen out of an authorised capital of 800,000 yen) has been taken up by the Sumitomo Cable Works.

Italy

PRODUCTION OF FERMENTATION GLYCERINE, ethyl alcohol, acetaldehyde and vegetable casein is planned by a company now being formed under the style of Glicerina Alcool Caseina Etere S.A.

CONSIDERABLE ACTIVITY PREVAILS in connection with rayon industry expansion. The Soc. Generale della Viscosa is extending its viscose plant at Rome: the Snia Viscosa is enlarging its factory at Turin; the Sussidiaria Applicazioni Rayon of Rome is enlarging its factory at Cusano Milanino.

References to Current Literature

Inorganic

Silica gel. Peronnet and Genet, *J. Pharm. et Chim., 129,* 490-497.

Recovery of chromates from waste waters. Liebetanz, *Metallwar. Ind. u. Galvano-Technik, 36,* 4

Chemical reactions of heavy hydrogen. Geib, *Z. Elektrochem., 44,* 81-87.

Pure colloidal carbon. Milbauer, *J. Chim. Phys., 34,* 641-648.

Reduction, oxidation and carbonising reactions of iron. Schenk, Laymann and Jenckel, *Z. anorg. Chem., 235,* 65-76.

Recovery of sulphur dioxide from waste gases. Johnstone, Read and Blankmeyer, *Ind. Eng. Chem., 30,* 101-109.

Hydraulic cements. Lea, *Chem. and Ind., 57,* 71-75.

Organic

Derivatives of pyrrol. Rinkes, *Rec. Trav. Chim. Pays-Bas, 56,* 1,224-1,228.

Oxidation of hydrocarbons in vapour phase. Chowdhury and Saboor, *J. Indian Chem. Soc., 14,* 633-643.

Polyterpenes. Ruzicka, *Angew. Chem., 51,* 5-11.

Hydroquinone and its oxidation products. Staude, *Z. wissenschaft. Photographie, 37,* 3-5.

Action of ammonia on benzil and benzoin. Davidson, Weiss and Jelling, *J. Org. Chem., 2,* 319-334.

Thermal polymerisation of styrol. Suess and Springer, *Z. Phys. Chem., 181,* B, 81-88.

Synthesis of esters from olefines and organic acids. Evans, Edlund and Taylor, *Ind. Eng. Chem., 30,* 55-58.

Salicylates. Lesser, *Drug Cosmetic Ind., 41,* 768-771.

Analysis

Determination of vanadium. Ampt, *J. Australian Chem. Inst., 4,* 431-434.

Determining lead in solder. Gaugl and Brecher, *Osterreichische Chem. Ztg., 41,* 9-12.

Quantitative spectral analysis of iron alloys. Limmer, *Z. wissenschaft. Photographie, 37,* 41-50.

Determination of heavy hydrogen. Harteck, *Z. Elektrochem., 44,* 3-8.

Determination of starches. Hock, *Biochem. Z., 294,* 336-341.

Microchemical mineral analysis. Martini, *Mikrochem., 23* 159-164.

Mercurimetric determination of silver. Trtilek, *Mikrochem., 23,* 190-194.

Examination of explosives. Azzam, *Mikrochim. Acta, 2,* 283-286.

Estimation of helium and neon in gas mixtures. Schröber, *Z. analyt. Chem., 111,* 161-169.

Determination of iron in formaldehyde. Hambersin, *Bull. Soc. Chim. Belg., 46,* 519-524.

Determination of orpiment in shellac. Rangaswami and Sen, *Analyst, 63,* 36-37.

Mineral Oils, Gas, Tar

Iron oxide mixed catalysts and the water gas reaction used in rendering coal gas non-poisonous. Panning and Bülow, *Gas u. Wasserfach, 80,* 902-908.

Sulphur compounds in oils. Gerhard-Free, *Chem. Ztg., 62,* 41-43.

Hydrogenation. Williams, *Ind. Chem., 14,* 33-34.

Cellulose, Paper

Decomposition of cellulose by oxidising agents. Staudinger and Jurisch, *Papier Fabrik. (techn. Teil), 35,* 462-469.

Bleaching of sulphite cellulose pulp. *Zellstoff u. Papier, 40,* 534-538.

Films of mixed esters of cellulose. Peroldi-Ciacca, *Rev. Générale Matières Plastiques, 35,* 307-311.

Acidity of paper. Burton, *Analyst, 63,* 19-27.

Ethyl cellulose solvents. Kauppi and Bass, *Ind. Eng. Chem., 30,* 74-79.

Acid-pulping of pine for viscose manufacture. Carpenter and McCall, *Ind. Eng. Chem., 30,* 15-20.

Bleaching, Dyeing, Finishing

Ferrous sulphate in textile printing and dyeing. *Text. Colorist, 59,* 807-810.

Textile assistants; chemistry and use. Brown, *Text. Colorist, 59,* 821-823, 843.

Sodium bicarbonate in calcium hypochlorite baths. Göbel, *Melliand Textilber, 19,* 64.

Artificial wools. Rolland, *Teintex, 3,* 2-8.

Cellulose base permanent finishes. Bonnet, *Teintex, 3,* 37-43.

Glass, Ceramics

Glass fibres. Krüger, *Glastechn. Ber., 15,* 461-463.

Acid resisting enamels. Spencer-Strong, *J. Amer. Ceramic Soc., 21,* 1-8.

Vesicular glass. Springer, *Glashütte, 67,* 798-800.

Uniting ceramic material with metal and glass. Handrek, *Ber. deutschen Keram. Ges., 18,* 539-548.

Metals, Electrometallurgy

Reduction of chromium oxide with hydrogen and solid carbon. Baukloh and Henke, *Z. anorg. Chem., 234,* 307-310.

Modern rust, acid and heat resisting steels. Krefeld, *Metallwirtschaft, 16,* 1,329-1,342.

Recovery of noble metals from silver, gold and platinum baths. Wogrinz, *Metallwar. Ind. u. Galvano-Technik, 36,* 10-12.

Passivity of chromium. Müller, *Z. Phys. Chem., 181,* B, 89-112.

Electrochemistry of titanium. Haissinsky and Emmanuel-Zavizziano, *J. Chim. Phys., 34,* 641-648.

Chromium-manganese heat resisting steels. Monypenny, *Metallurgia, 17,* No. 97, 7-12.

Fats, Oils, Waxes

Liquid soaps. *Seifensieder Ztg., 64,* 980-981.

Vegetable oils for manufacture of solidified fats. Galle and Friedl, *Ole Fette Wachse,* 1937, No. 12, 1-3.

Perila and soya oils. Kemner, *Farbe u. Lack,* 1937, No. 50, 595-596.

Cottonseed oil sterols. Wallis and Chakravorty, *J. Org. Chem., 2,* 335-340.

Synthetic fatty acids. Henk, *Seifensieder Ztg., 64,* 1,001-1,002.

Paints, Pigments, Resins

Adhesion of paint films. Forder, *Paint Manuf., 8,* 9-10.

Effect of sunlight on coloured paints. Kessler, *Farben Ztg., 43,* 39-41.

Bituminous protection paints for concrete. Platzmann, *Bitumen, 7,* 211-213.

Drying of linseed oil paints. Nicholson and Holley, *Ind. Eng. Chem., 30,* 114-116.

Oil-resin ratios in oil varnishes. Wolff and Zellner, *Paint Varnish Prod. Manager, 18,* 7-10.

Zinc resinate in the paint and varnish industry. Edelstein, *Fed. Paint Varnish Prod. Clubs Dig.,* No. 171, 371-374.

Rubber, Plastics

Sulphur in urea-formaldehyde plastics. Berrier, *Rev. Générale Matières Plastiques, 53,* 296-298.

Manufacture of safety glass. Herfurth, *Diamant, 59,* 364-365.

Oxidation products of rubber. *Rev. Produits Chim., 40,* 737-741.

Miscellaneous

Coloured resins, adhesives and textile dyestuffs from urea. Steigmann, *Kolloid Z., 81,* 330-334.

Physical measurements in the chemical industry. Gmelin, *Chem. Fabrik, 11,* 1-10.

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Personal Notes

LORD ARMSTRONG, who is a director of the Thermal Syndicate, Ltd., and is now 75 years of age, collapsed at a function which was being held in Newcastle on January 25, and oxygen had to be applied.

THE LATE MR. WILLIAM LUMB WHITELEY, of Highfield, Pool, Yorks, head of B. S. and W. Whiteley, Ltd,. paper manufacturers, left estate valued £53,143, with net personalty £41,981.

MR. TOM STEVENSON, formerly of Coatbridge, has been appointed secretary of the reconstituted British Steelwork Association, with headquarters at Steel House, Tothill Street, London.

MR. JOHN HUNTER is vacating the position of general manager of the collieries of the Staveley Coal and Iron Co., Ltd., in order to become managing director of Doncaster Amalgamated Collieries, Ltd., and managing director of the newly-formed Arkwright Coal Co., Ltd.

DR. RICHARD VERNON WHEELER, professor of fuel technology at Sheffield University, and director of the Safety in Mines Board Experimental Stations, was presented with the medal of the Institution of Mining Engineers at a dinner at Grosvenor House, London, on February 2.

DR. R. B. WASICKY, professor of pharmacognosy in the pharmaceutical Institute of the University of Vienna, will deliver a lecture on "Modern Points of View and Methods in Pharmacognosy," at a meeting of the Pharmaceutical Society on February 8, when the Hanbury medal awarded to him will be presented. The lecture will deal with the application of

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Professor R. Wasicky.

modern microscopical instruments, permitting the characterisation of surface structure with the strongest objectives in vertical incident light; methods of fluorescence; semi-micro-chemical and micro-chemical methods; ultra-spectrography of drug ingredients; quantitative taste test; chromotographical analysis of adsorption; improvement of the quality of drugs by cultivation; stabilisation of drugs and pharmacognosy from the biological point of view.

DR. C. A. BEEVERS, who is a lecturer in physics at the University College of Hull, has been awarded the Dewar Research Fellowship, valued at £450 per year and tenable for three years. This fellowship, now awarded for the first time, was established under the will of the late Lady Dewar, widow of Sir John Dewar, to promote research in either physics or chemistry. The present award has been made for research in crystallography.

THE LATE SIR EVAN SPICER, of Belair, Dulwich, of Spicers, Ltd., paper makers, left estate valued £120,166, with net personalty £118,312.

MR. JAMES LEICESTER, M.Sc. (Sheffield), has been appointed demonstrator in applied chemistry in the faculty of technology at Manchester University.

THE LATE MR. SAMUEL CUTLER, a director of C. and W. Walker, Ltd., and Dry Gasholders, Ltd., left estate valued £32,234, with net personalty £31,022.

MR. F. H. F. VAN VLISSINGEN, junior, has been appointed a director of British Enka Artificial Silk, Ltd., in place of Mr. F. H. F. van Vlissingen, who has resigned.

THE LATE MR. HENRY RIDLEY, of Chantry Grove, near Ipswich, chairman of Grimwade, Ridley and Co. (Ipswich), Ltd., wholesale chemists, left estate valued £75,573, with net personalty £66,555.

MR. HENRY M'NAIR, chief chemist and metallurgist to Smith and Wellstood, Ltd., ironfounders, Bonnybridge, has been appointed technical executive to Richmond's Gas Stove Co., Warrington, associated with Radiation, Ltd.

DR. CHARLES SIMONS, Ph.D., London, D.I.C., A.I.C., has been awarded the fourth Pedler research scholarship by the council of the Institute of Chemistry. He will study the formation of volatile compounds of arsenic and selenium by micro-organisms, from both technical and hygienic aspects, and will work under the general supervision of Professor F. Challenger, in the organic chemistry department at Leeds University. The annual value of the Pedler Scholarship, which was founded under the will of the late Sir Alexander Pedler, is £300. It is awarded for one year, but may be renewed for a further year.

Ten Years Back

From "The Chemical Age" of February 4, 1928

Indian indigo exports for November, 1927, amounted to 53 cwts., compared with 57 for the corresponding month the year before.

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The Japan Chemical Industry Association, the largest organisation of the kind in Japan, has decided to start a movement to urge the Government authorities to adopt positive measures on the promotion of chemical industry.

* * * *

Sales of nitrate of soda reported by the Producers' Association during the fortnight ended January 15, amounted to 24,232 metric tons for shipment up to June, 1928, and 25,908 metric tons for delivery in the 1928-29 nitrate year.

* * * *

An agreement has been concluded between the Polish Government and the Naphtha Syndicate by which the latter will advance sixteen millions and the Government four and a half million zloty, for increased naphtha exploitation, but only the interest on the money will be used, and the capital remain untouched.

* * * *

Unemployed insured persons at December 19, 1927, in chemicals manufacture in Great Britain numbered 5,516 (males 4,835, females 681); in explosives manufacture, 1,024 (males 748, females 276); in paint, varnish, red and white lead manufacture, 841 (males 689, females 152); in oil, grease, glue, soap, ink, match, etc., manufacture, 4,520 (males 3,758, females 762). The numbers of insured persons in Great Britain and Northern Ireland in the same industries were 72,860, 12,900, 14,380 and 59,160 respectively. The percentages unemployed in Great Britain only were 5.8, 5.4, 4.5, and 5.7 respectively.

From Week to Week

A GUIDE TO THE RIGHT ELECTRODE for electric arc welding has been published by Murex Welding Processes, Ltd.

PREPARATIONS FOR THE INTERNATIONAL SPRING FAIR 1938, at Leipzig, which opens on March 6, are already in full swing. The druggist's supplies group will be represented by about 150 firms.

SCOTTISH BRANCHES of the National Union of Dyers, Bleachers and Textile Workers are taking a ballot on a proposal to stop work to enforce their claim for an increase of 2s. 1d. a week, and 12 days' holiday with pay.

THE ROUMANIAN OIL OUTPUT in 1937 was lower by 16 per cent. than in the previous year. The decline is attributed to the drying up of wells, especially those of the big companies. For instance, production of Astra Romana was only 1,650,000 tons, against 1,900,000 in 1936.

DEMONSTRATIONS OF BURGLAR AND FIRE ALARMS was held by Burgot Alarms, Ltd., at the Great Eastern Hotel, London, January 25 to 28. These alarms actually ring up the police or fire station and announce the situation of the premises where the burglary or fire is in progress.

DURING THE NEXT FEW MONTHS, farmers are to have the opportunity of visiting the granular superphosphate factory of Fison, Packard and Prentice, Ltd., at Cliff Quay, as well as the compounding factory at Bramford, Ipswich. Parties will be taken round the Cliff Quay Works on Wednesdays and round the Bramford Works on Thursdays, at 2.30 p.m. in each case.

THE ASSOCIATION OF CONSULTING CHEMISTS AND CHEMICAL ENGINEERS, INC., of 50 East 41st Street, New York, has published its 1938 Directory of Members. In addition to the usual data expected in a directory, valuable details are given about the work these consultants are especially prepared to undertake. Copies can be obtained on request to the Association at 50 East 41st Street, New York.

LANCEGAYE SAFETY GLASS (1934), LTD., have almost completely equipped their new factory at Willesden, and production of toughened glass has begun, states Mr. M. Gordon Liverman, chairman of the company, in a letter to shareholders. Litigation relating to the company's less important process for the manufacture of laminated glass is still pending and the directors continue to be of the opinion that, whatever the result, no serious detriment will be suffered by the company.

THE JOINT INDUSTRIAL COMMITTEE for the Chemical Industry agreed, in London on Tuesday, to an advance in wages of five-eighths of a penny an hour for workers in the heavy chemical industries throughout England and Wales. The advance is to come into operation at the beginning of the pay-week after February 5. This is equivalent to an increase of from 2s. 6d. to 3s. a week for both day and shift workers. The settlement does not apply to Imperial Chemical Industries, Ltd., for whose workers there was a separate agreement some weeks ago.

BY AN ADDITIONAL IMPORT DUTIES ORDER, issued on the recommendation of the Import Duties Advisory Committee, the rate of duty on lithopone is increased from 20 per cent. *ad valorem*, to £3 5s. a ton, or 20 per cent. *ad valorem*, whichever is the greater. The committee says that before 1936, with the aid of protection which reduced imports, home production was appreciably expanded, a substantial export trade built up and home prices materially reduced. In 1936 imports recovered to a level higher than at any time since 1931, and last year they were in still greater volume.

OXFORD UNIVERSITY is to pay £70,000 in settlement of the claim for £750,000 brought against it by Sugar Beet and Crop Driers, Ltd. The claim followed the conviction of Brynar James Owen, who was director of the Institute for Research in Agricultural Engineering at Oxford from 1924 until his dismissal in 1931, for forgery and fraudulent representation. The Vice-Chancellor of the University has pointed out that the action in question was a claim for upwards of £750,000. The allegations of Sugar Beet and Crop Driers and of the two other joint plaintiffs were: That Brynar James Owen, as Director of the Institute for Research in Agricultural Engineering, sold to the plaintiff company in 1926 some patents which he fraudulently stated provided a method of extracting sugar from beet, superior to any method then in existence; that the company was led by Owen to think that certain of the patents purchased by it were being sold by the University, and that it was as agent for the University that he made the representations on the strength of which the purchase was effected; that the patents turned out in practice to be worthless, with the result that the capital sunk in them by the company was wasted; and finally, that the company was led into still further losses through believing that Owen, who acted as its confidential adviser, and in that capacity was allowed to exercise a wide discretion, was, in the advice he gave to the company, acting with the knowledge and on behalf of the University.

SATURN OXYGEN CO., LTD., 14 Finsbury Circus, E.C.2, have increased their nominal capital by the addition of £100,000, in £1 shares, beyond the registered capital of £200,000.

A NEW DRYING OVEN, INCUBATOR AND STERILISER, and a new laboratory muffle furnace with automatic temperature control, have been introduced by Griffin and Tatlock, Ltd.

BIDEFORD BLACK PIGMENTS, LTD., has reprinted the British Standard Specification for Black (Carbon) Pigments for Paints, No. 288-1937, for the benefit of users of mineral black.

CHEMISTRY IN RELATION TO FIRE INSURANCE was the subject of an address by Dr. R. B. Strathdee, lecturer in chemistry at Aberdeen University, to the Insurance Institute at Aberdeen, on January 17.

AT LEAST FORTY WORKERS WERE KILLED and about 400 were injured in the explosion at Parodi-Delsino explosives factory in Colleferro, 43 miles from Rome, on January 29. The explosion was felt over an area of nearly 800 square miles.

THERE WAS A FURTHER INCREASE in the number of students in the Department of Coal Gas and Fuel Industries with Metallurgy, at Leeds University, in the last session. The total number of students was 41, compared with 37 in 1936-37 and 29 in 1935-36.

A NEW CORRELATION COLOUR CHART issued by the British Colour Council outlines fashion colour schemes for Spring and Summer, 1938. The chart bases its themes on the colours featured on the silk, wool and cotton cards and in the hosiery and leather book issued to members in July last.

A PUBLIC LECTURE on "The Chemist's Quest for Colour," was given by Dr. R. G. M. Dakers, at the Heriot-Watt College, Edinburgh, on January 28. The lecturer dealt with natural and synthetic dyes, and gave practical demonstrations of the formation of dyes and their application to different fabrics.

FIVE ADDITIONAL PROSPECTING LICENCES, covering a total area of approximately 669 square miles, in Yorkshire and Lancashire, have been issued by the Board of Trade under the Petroleum (Production) Act, 1934, and the Petroleum (Production) Regulations, 1935, to the Gulf Exploration Company (Great Britain), Ltd.

A GENERAL DISCUSSION on Chemical Reactions Involving Solids will be held in the large lecture theatre of the Department of Physics, University of Bristol, April 11 to 13. The discussion will cover energy levels in real and ideal crystals, conduction in solids (excluding metals), diffusion and chemical change in solids, photochemical processes, chemical decomposition of solids (including detonation), reactions between solid phases, and reactions of solids with gases and liquids (with particular reference to solid carbon).

THE INSTITUTE OF EXPORT has drawn attention to the imminence of increased rates for code telegrams. There are two courses open, industry will either have to pay more or improve existing coding systems. The Institute is helping firms to improve their coding systems by a series of lectures from one of its members, Mr. C. Sutherland, whose experience is not only exhaustive, but who has the gift of imparting it to others. Although the series of lectures has already started, constructional tuition does not begin until February 8.

LEAFLETS ISSUED BY THE HOME OFFICE explaining the provisions of the Factories Act, 1937, which will come into force in July, have been sent to the 260,000 occupiers of factories in Great Britain. In a foreword Sir Samuel Hoare, the Home Secretary, states: "It marks the notable progress made in the last thirty-six years, leaving far behind it the Act of 1901, and showing in its up-to-date provisions what should now be done to secure a further reduction in the toll of accidents and sickness, and a general advance in the conditions of factory life."

A STRIKE IS THREATENED by the unions in the metallurgical industry of the Nord, France, representing 80,000 workers, 70,000 of whom belong to the Confédération Générale du Travail, unless they receive wages that will restore the standard of living obtaining in June of last year. The workers' claim has been submitted to arbitration, but the suspicion is expressed that the employers seek to exercise unfair pressure on the arbitral board. A composite delegation representing the workers was received on February 1, by M. Frossard, the Minister of State specially brought into the Cabinet as an industrial peacemaker.

Books Received

Calculations in Quantitative Chemical Analysis. By John A. Wilkinson. 2nd edition. London: McGraw-Hill Publishing Co., Ltd. Pp. 154. 10s. 6d.

Laboratory Technique in Organic Chemistry. By A. A. Morton. London: McGraw-Hill Publishing Co., Ltd. Pp. 261. 15s.

Inventions in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Applications for Patents

PRODUCTION OF COLOURED SOLUTIONS.—J. J. V. Armstrong (Compagnie Nationale de Matieres Colorantes et Manufactures de Produits Chimiques du Nord Reunies Etablissements Kuhlmann). 2216.

PROCESS FOR THICKENING UNSATURATED OILS.—C. Arnold (Standard Oil Development Co.). 2066.

VULCANISATION ACCELERATORS.—W. Baird, R. F. Goldstein, G. E. Nettleship, and Imperial Chemical Industries, Ltd. 2436.

PRODUCTION OF AMINO-NITRILES.—Bergwerksverband zur Verwertung von Schutzrechten der Kohlentechnik Ges. (Germany, Jan. 20, '37.) 1981.

PRODUCTION OF PAPER MATERIALS.—British Celanese, Ltd. (United States, Jan. 28, '37.) 2139.

MANUFACTURE OF VAT DYESTUFFS.—A. Carpmael (I. G. Farbenindustrie.) 2422.

COPPER-PLATING ALUMINIUM.—F. R. H. Chambers. 2220.

MANUFACTURE OF ACTIVE ALKALOID.—Chemical Works, formerly Sandoz. (Switzerland, Jan. 27, '37.) 2426.

APPARATUS FOR OLIGODYNAMIC ACTIVATION OF WATER.—J. Deninger. (Germany, Jan. 20, '37.) 1946.

COLOUR PREPARATIONS for ceramic articles.—Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler. (Germany, Feb. 9, '37.) 1928.

TREATMENT OF SEAWEED.—T. Dillon, D. T. Flood, V. C. Barry, and P. O'Muineacain. (Irish Free State, May 5, '37.) 1892.

MANUFACTURE OF ORGANIC COMPOUNDS.—H. Dreyfus. 1923.

MANUFACTURE OF ALIPHATIC COMPOUNDS.—H. Dreyfus. 1924.

MANUFACTURE OF CELLULOSE DERIVATIVES.—H. Dreyfus. 2375.

MANUFACTURE OF AZO DYESTUFFS.—E. I. du Pont de Nemours and Co. (United States, Jan. 23, '37.) 2300, 2301.

PRODUCTION OF PURE ALUMINA.—Dyckerhoff, Portland-Zementwerke, A.-G. (Germany, Jan. 29, '37.) 1931; (Feb. 15, '37.) 1932.

DISTILLATION OF NATURAL GLYCERIDES, ETC.—Eastman Kodak Co. (Aug. 18, '36.) (United States, Aug. 24, '35.) 1869.

ARTICLES MOULDED FROM SYNTHETIC RESIN.—W. Engel. (Aug. 1, '36.) (Germany, Aug. 21, '35.) 1872.

RECOVERY OF NAPHTHALENE.—Evence Coppee and Cie. (Belgium, Jan. 3, '38.) 2062.

MANUFACTURE OF ALIPHATIC COMPOUNDS.—L. Fallows, and E. V. Mellers. 1925.

MANUFACTURE OF POROUS RUBBER ARTICLES from aqueous emulsions, etc.—Firestone Tyre and Rubber Co., Ltd. (United States, Feb. 11, '37.) 2080.

MANUFACTURE OF ETHERS of mono-hydroxy-halogen-1:4-benzoquinones.—W. W. Groves (I. G. Farbenindustrie.) 1910.

MANUFACTURE OF ETHERS of amino-hydroxy-1:4-benzoquinone derivatives.—W. W. Groves (I. G. Farbenindustrie.) 1911.

MANUFACTURE OF BENZOQUINONE DERIVATIVES.—W. W. Groves (I. G. Farbenindustrie.) 2042.

MANUFACTURE OF DIOXAZINE DYESTUFFS.—W. W. Groves (I. G. Farbenindustrie.) 2176.

MANUFACTURE OF 5:6:7:8-TETRAHYDROANTHRAQUINONE DERIVATIVES.—W. W. Groves (I. G. Farbenindustrie.) 2382.

MANUFACTURE OF SUBSTANCES of capillary action.—W. W. Groves (I. G. Farbenindustrie.) 2383.

MANUFACTURE OF ISOCYLIC COMPOUNDS.—W. W. Groves (I. G. Farbenindustrie.) (June 5, '36.) 2384.

CHROMIUM-NICKEL ALLOYS.—Heraeus-Vacuumschmelze, A.-G. (Germany, March 4, '37.) 2402.

PRODUCTION OF OIL.—L. T. Hopkinson. (United States, Feb. 2, '37.) 2199.

PRODUCTION OF MALLEABLE IRON.—A. G. E. Hultgren. (Sweden, Jan. 25, '37.) 2099.

TANNING-AGENTS.—I. G. Farbenindustrie. (Germany, Jan. 25, '37.) 2076; (Germany, Jan. 27, '37.) 2077.

PRODUCTION OF HYDROXY COMPOUNDS.—I. G. Farbenindustrie. (Germany, June 24, '37.) 2468.

MANUFACTURE OF SPIRIT PRINTING-INKS.—Imperial Chemical Industries, Ltd. (United States, Jan. 21, '37.) 1974.

MANUFACTURE OF COMPOUNDS OF ANTHRAQUINONE SERIES.—G. W. Johnson (I. G. Farbenindustrie.) 2536.

SEPARATION OF MIXTURES OF OILS and solid substances.—G. W. Johnson (I. G. Farbenindustrie.) 2537.

MANUFACTURE OF COMPOUNDS OF ACETYLENES.—G. W. Johnson (I. G. Farbenindustrie.) 2538.

SYNTHESISING LIQUID HYDROCARBONS.—M. W. Kellogg Co. (United States, Jan. 26, '37.) 2516.

CORRECTED MAGNESIA REFRACTORIES.—E. J. Lavino and Co. (United States, Feb. 2, '37.) 2031.

PRODUCTION OF SILICATE REFRACTORIES.—E. J. Lavino and Co. (United States, Jan. 28, '37.) 2244.

BASIC REFRACTORIES.—E. J. Lavino and Co. (United States, Feb. 10, '37.) 2484.

MANUFACTURE OF WATERPROOF PLY FABRICS.—Minster Linen Process Co., Ltd., and M. Marcus. 1963.

CATALYTIC SYNTHESIS OF HYDROCARBON OILS from gaseous mixtures of carbon monoxide and hydrogen.—W. W. Myddleton. 2167.

APPARATUS FOR PRODUCING REACTIONS OF ATOM NUCLEI.—Naamlooze Vennootschap Philips' Gloeilampenfabriken. (Holland, Jan. 23, '37.) 1948.

MANUFACTURE OF MAGNESIUM OXIDE.—P. Perani. (Italy, Jan. 23, '37.) 2304.

PRODUCTION OF LEAD ALLOYS.—Pirelli-General Cable Works, Ltd., and G. Martinez. 2478.

MANUFACTURE OF ETHER DERIVATIVES of polyhydric alcohols.—Procter and Gamble Co. (United States, July 9, '37.) 2193.

TREATMENT OF TEXTILE FIBRES.—B. P. Ridge, A. H. Little and Imperial Chemical Industries, Ltd. 1975.

PLASTIC COMPOSITIONS.—A. G. Rodwell, and S. H. Colton. 2313.

COATING-COMPOSITIONS.—Rubtex, and P. Slansky. 2166.

MANUFACTURE OF DISPERSING AGENTS.—H. Schou. 1929.

MANUFACTURE OF AZO-DYESTUFF DERIVATIVES.—Soc. of Chemical Industry in Basle. (Switzerland, Jan. 26, '37.) 2514; (Switzerland, Jan. 7.) 2515.

CONVERSION OF MIXED ISO- AND NORMAL BUTANES.—Standard Oil Development Co. (United States, March 16, '37.) 2405.

RUBBER COMPOUNDS.—J. Stein. (United States, Jan. 21, '37.) 2101.

TREATMENT OF RUBBER LATEX.—United States Rubber Products, Inc. (United States, Aug. 10, '37.) 2075.

ELECTRO-DEPOSITION OF SILVER, ETC.—H. Wheeler, and G. H. Bloomer. 2452.

MANUFACTURE OF WHITE LEAD.—A. Wreschner. 2377.

Specifications Open to Public Inspection

PROCESS FOR THE PRODUCTION OF 2-KETO-1-GULONIC ACID.—K. Merck, L. Merck, W. Merck, and F. Merck (trading as E. Merck (firm of)). July 18, 1936. 12967/37.

LOW AND MEDIUM TEMPERATURE CARBONISATION OF FUELS.—Dr. C. Otto and Co., Ges. July 18, 1936. 15206/37.

MAKING SOLUTIONS OF CELLULOSE IN SULPHURIC ACID.—I. G. Farbenindustrie. July 21, 1936. 16593/37.

PRODUCTION OF BERYLLIUM COMPOUNDS from beryllium ores.—Seri Holding Soc. Anon. July 20, 1936. 17642/37.

MANUFACTURE OF COMPLEX COMPOUNDS.—W. Traube, and F. Kuhbier. July 22, 1936. 17967/37.

CELLULOSE DERIVATIVE and process of making the same.—Cellulose Holdings, Ltd. July 24, 1936. 19018/37.

PROCESSES FOR THE MANUFACTURE OF DIESEL and like fuels.—F. Uhde, and T. W. Pfirrmann. July 23, 1936. 19149/37.

PROCESS FOR CARRYING OUT ENDOTHERMIC CHEMICAL REACTIONS of organic compounds.—Naamlooze Vennootschap de Battaafsche Petroleum Maatschappij. July 20, 1936. 19797/37.

MANUFACTURE OF VINYL METHYL KETONE.—I. G. Farbenindustrie. July 24, 1936. (Cognate Application, 19847/37.) 19846/37.

PROCESS FOR MANUFACTURING LUBRICANTS.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. July 24, 1936. 19996/37.

PROCESS FOR PRODUCING ACID OILS.—Naamlooze Vennootschap de Battaafsche Petroleum Maatschappij. July 21, 1936. 19997/37.

ARTIFICIAL MATERIALS.—E. I. du Pont de Nemours and Co. July 20, 1936. 20052/37.

PROCESS FOR THE PREPARATION OF ALUMINA.—Montecatini, Soc Generale per L'Industrie. Mineraria, ed Agricola. July 20, 1936. 20112/37.

MANUFACTURE AND PRODUCTION OF BUTADIENE.—I. G. Farbenindustrie. July 24, 1936. 20221/37.

PRODUCTION OF ARTIFICIAL MATERIALS.—British Celanese, Ltd. July 21, 1936. 20226/37; July 22, 1936. 20356/37.

MANUFACTURE OF PIGMENTED COMPOSITIONS.—E. I. du Pont de Nemours and Co. July 22, 1936. 20379/37.

PRODUCTION OF PIGMENTED COMPOSITIONS IN ORGANIC VEHICLES. E. I. du Pont de Nemours and Co. July 22, 1936. 20380/37.

AZO COMPOUNDS.—E. I. du Pont de Nemours and Co. July 22, 1936. 20381/37.

PRODUCTION OF MONO-AZO DYESTUFFS.—Compagnie Nationale de Matieres Colorantes et Manufactures de Produits Chimiques du Nord Reunies Etablissements Kuhlmann. July 23, 1936. 20409/37.

METHOD OF MANUFACTURING RUBBER-LIKE MATERIALS.—Sumitomo Electric Wire and Cable Works, Ltd. Dec. 7, 1935. (Divided out of 32557/36.) 1673/38.

PROCESS OF DISTILLATION OF NATURAL GLYCERIDES and preparation of vitamin compositions.—Eastman Kodak Co. Aug. 24, 1935. (Divided out of 22675/36.) 1869/38.

Specifications Accepted with Dates of Application

MANUFACTURE OF IRON OR STEEL.—Soc. D'Electro-Chimie, D'Electro-Metallurgie, et des Acieries Electriques D'Ugine. April 16, 1935. 478,562.

PHOTOGRAPHIC DEVELOPERS.—W. W. Groves (I. G. Farbenindustrie.) May 11, 1936. 478,345.

TREATMENT OF HYDROCARBONS with activated phosphorous pentoxide.—B. Malishev. May 14, 1936. 478,424.

ELECTRODEPOSITION OF TUNGSTEN and its alloys.—H. H. Armstrong. May 18, 1935. 478,640.

ROASTING OF ORES especially zinc sulphide ores containing lead and/or cadmium.—S. Robson, T. B. Gyles, and National Smelting Co., Ltd. May 21, 1936. 478,642.

PRINTING WITH VAT-DYESTUFFS.—W. W. Groves and I. G. Farbenindustrie. June 20, 1936. 478,567.

MANUFACTURE OF PHENOLIC COMPOUNDS containing a chloromethyl group, and nitrogen containing condensation products therefrom.—W. W. Groves (I. G. Farbenindustrie.) July 16, 1936. 478,571.

PRODUCTION OF FAST DYEINGS.—G. W. Johnson (I. G. Farbenindustrie.) July 17, 1936. 478,696.

PROCESS FOR THE MANUFACTURE OF AZO DYESTUFFS.—A. Carpmael (I. G. Farbenindustrie.) July 17, 1936. 478,514.

STABLE DISPERSIONS OF WATER or aqueous liquids in organic substances.—H. Schou. July 18, 1936. 478,697.

MANUFACTURE OF STEROL DERIVATIVES.—I. G. Farbenindustrie. July 18, 1935. (Sample furnished.) 478,583.

MANUFACTURE AND PRODUCTION OF VAT DYESTUFFS of the anthraquinone oxazole series.—G. W. Johnson (I. G. Farbenindustrie.) July 20, 1936. 478,700.

MANUFACTURE AND PRODUCTION OF SHAPED ELASTIC MASSES.—G. W. Johnson (I. G. Farbenindustrie.) July 20, 1936. 478,701.

PROCESS FOR THE MANUFACTURE OF ANTIMONY OLEATES.—A. Carpmael (I. G. Farbenindustrie.) July 20, 1936. 478,587.

PRODUCTION OF PHENOLIC SYNTHETIC RESINS.—Bakelite, Ltd. March 13, 1936. 478,589.

CATALYSIS.—Houdry Process Corporation. Aug. 27, 1935. 478,592.

MANUFACTURE OF SYNTHETIC RUBBER-LIKE MATERIALS.—B. J. Habgood, R. Hill, L. B. Morgan, and Imperial Chemical Industries, Ltd. July 20, 1936. 478,593.

ALUMINIUM ALLOYS.—Vereinigte Deutsche Metallwerke, A.-G. Jan. 24, 1936. 478,659.

MANUFACTURE AND PRODUCTION OF RESINS.—G. W. Johnson (I. G. Farbenindustrie.) July 22, 1936. 478,370.

MANUFACTURE OF COMPOSITIONS containing chlorinated rubber. N. Bennett, and Imperial Chemical Industries, Ltd. July 22, 1936. 478,664.

ANTHRAQUINONE DERIVATIVES.—G C. Semple, C. Shaw, and Imperial Chemical Industries, Ltd. July 22, 1936. 478,665.

MANUFACTURE OF HYDROCARBON GASES from coal.—H. Dreyfus. July 23, 1936. 478,668.

PROCESS FOR THE MANUFACTURE OF HIGHLY ACETYLATED CELLULOSE.—L. S. E. Ellis (P. Koetschet.) July 23, 1936. 478,716.

MANUFACTURE OF ACETALS.—A. Contardi and B. Ciocca. July 26, 1935. 478,684.

MANUFACTURE AND PRODUCTION OF LIQUID POLYMERISATION PRODUCTS of a low degree of polymerisation from olefines.—G. W. Johnson (I. G. Farbenindustrie.) Aug. 5, 1936. 478,601.

PRODUCTION OF BLUE PIGMENTS.—Kali-Chemie, A.-G. Aug. 28, 1935. 478,523.

PREPARATION OF DIPHENYLGUANIDINE.—G. Knoth. Feb. 13, 1936. 478,525.

INSECTICIDES.—Rohm and Haas Co. Sept. 27, 1935. 478,604.

MANUFACTURE AND USE OF CATALYSTS for hydrogenation and like processes.—T. H. Durrans, and B. T. D. Sully. Oct. 8, 1936. 478,386.

MANUFACTURE OF AZO DYESTUFFS.—Soc. of Chemical Industry in Basle. Oct. 23, 1935. 478,609.

SINTERED HARD METAL ALLOYS.—F. Krupp, A.-G. (Dec. 2, 1935. (Addition to 19468/36.) 478,534.

SAPONIFICATION OF OILS, fats, and the like.—A. Welter. Dec. 6, 1935. 478,536.

MANUFACTURE AND PRODUCTION OF TANNING-AGENTS.—I. G. Farbenindustrie. Nov. 23, 1935. 478,537.

RECOVERY OF SULPHUR DIOXIDE from gases.—R. F. Bacon. Dec. 24, 1935. 478,544.

RENDERING MATERIALS MOTH-PROOF.—A. J. Stephens (J. R. Geigy, A.-G.) Feb. 6, 1937. (Convention date not granted.) 478,398.

MANUFACTURE OF COMPOUNDS of the azole series.—I. G. Farbenindustrie.) Feb. 28, 1936. (Sample furnished.) 478,549.

CONCENTRATION OF AQUEOUS DISPERSIONS OF RUBBER and similar rubber-like substances. Metallges, A.-G. March 21, 1936. 478,406.

MANUFACTURE OF AMINOARYL SULPHONES.—Soc. of Chemical Industrie in Basle. May 26, 1936. 478,624.

MANUFACTURE OF VALUABLE OILS and/or gases from coal by a hydrogenation process.—H. Dreyfus. July 23, 1936. 478,720.

RECOVERY OF HYDROCARBONS.—W. H. A. Thiemann (Carbo-Norit-Union Verwaltungs-Ges.). June 7, 1937. 478,486.

REACTIVATION OF CATALYSTS used in hydrogenation and like processes.—T. H. Durrans, and B. T. D. Sully. Oct. 8, 1936. 478,487.

MANUFACTURE OF MAGNETIC ALLOYS.—Heraeus-Vacuumschmelze, A.-G. June 27, 1936. 478,625.

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

Peru.—An importer and commission agent established in Lima wishes to establish contacts with United Kingdom manufacturers of raw materials for soap, cotton seed oil, cement and tile-colours. (Ref. No. 84.)

Chemical and Allied Stocks and Shares

THE continuance of very inactive conditions in the industrial and kindred sections of the Stock Exchange prevented a check to the downward movement in share values which has been in evidence in recent weeks. Nevertheless, a rather firmer tendency was reported subsequently on the hope that markets may become more active next week, when a new Stock Exchange account commences. Market sentiment is, however, still largely under the influence of the trade recession in the United States and the setback in commodity and metal prices, and the general belief is that the latter are unlikely to show strong recovery until an upward movement in industrial activity is resumed in America.

Imperial Chemical have been reactionary, and at 33s. are 1s. 3d. lower on the week. The market is now inclined to believe the directors are likely to place an even larger sum to reserve and is now less hopeful of a small increase in dividend. The disposition is to take the view that the directors may be influenced in their decision by any decline that may be shown in the company's large industrial and other investments as a result of the market conditions prevailing. Distillers at 102s. were a relatively steady feature, although moderately lower as compared with a week ago. British Oxygen declined from 80s. 7½d. to 78s. 9d., and Murex from 92s. 6d. to 91s. 10½d. General Refractories have reacted sharply on balance, but made partial improvement following the directors' statement.

Borax Consolidated, which were a good feature, have followed last week's rise from 27s. 3d. to 29s. 6d. with a further improvement to 30s. The market was pleased with the raising of the distribution to 10 per cent. by the addition of a cash bonus of 2½ per cent., which was, in fact, in excess of best estimates. The full results are awaited with a good deal of interest. Lever Brothers ordinary continued to be the subject of favourable dividend estimates, but, owing to the general trend in industrial shares, have reacted from 40s. to 38s. at the time of writing. Courtaulds fluctuated rather sharply, awaiting the dividend. At one time they were down to 44s., but have since recovered to 45s., which compares with 46s. 3d. a week ago.

Associated Portland Cement have not responded to the full terms of the proposed merger and moved down to 86s. 3d., which compares with 88s. 1½d. a week ago. This was, however, attributed mainly to the trend of markets, as the terms of the merger were well received generally, and the assumption in the market is that shareholders are again likely to receive a total distribution of 22½ per cent. for the year. Alpha Cement at 37s. 6d. are within 6d. of the price ruling a week ago. Tunnel Cement ordinary shares were steady at 46s. 3d.

Fison, Packard and Prentice were unchanged at 36s. 3d. A larger capital ranks for dividend in the current year, but the assumption in the market is that profits should reflect fuller benefits from the expansion of the business and that there are favourable possibilities of the dividend being at least maintained at 9 per cent. Moderately lower prices were made by most iron and steel shares. Dorman Long were affected by the news of labour troubles and Richard Thomas by reports of a temporary slowing down of work on the large new steel plant. On the other hand, hopes of larger dividends maintained a fairly steady tendency in Hadfields, and Consett Iron. United Steel were little changed pending declaration of the interim dividend.

Oil shares declined earlier in the week under the influence of the higher stocks of oil in America, but prices were inclined to show some recovery later on, attention being drawn to the apparently generous yields offered by "Shell," Anglo-Iranian and Trinidad Leaseholds.

Weekly Prices of British Chemical Products

TRADE in general chemicals, if not particularly brisk, has followed a very steady course during the past week and movements on the whole are regarded as satisfactory. Heavy acids have been in fairly good call and most of the Potash and Soda products are receiving a fair inquiry, but apart from the higher quotations recorded in our last issue there have been no important price alterations for general chemicals, rubber chemicals and wood distillation products. The duty on imported Lithopone has been increased to £3 5s. per ton, but it is impossible at the moment to say what effect, if any, this will have on market quotations. Quiet conditions continue to prevail in the coal tar section, and in the absence of any firm buying orders prices are a little erratic in quotation. A fair inquiry has been maintained for pyridine, but apart from this the market is featureless.

GLASGOW.—Business in chemicals for home trade has been rather quieter during the week, and there has been no special feature in the demand for export. Prices generally remain very steady at about previous week's figures, with no important changes.

General Chemicals

ACETONE.—**£45 to £47 per ton.**

ACETIC ACID.—Tech, 80%, £30 5s. per ton; pure 80%, £32 5s.; tech., 40%, £15 12s. 6d. to £18 12s. 6d.; tech., 60%, £23 10s. to £25 10s. MANCHESTER: 80%, commercial, £30 5s.; tech. glacial, £42 to £46.

ALUM.—Loose lump, £8 7s. 6d. per ton d/d; GLASGOW: Ground, £10 7s. 6d. per ton; lump, £9 17s. 6d.

ALUMINIUM SULPHATE.—£7 2s. 6d. per ton d/d Lancs. GLASGOW: £7 to £8 ex store.

AMMONIA, ANHYDROUS.—Spot, 1s. to 1s. 1d. per lb. d/d in cylinders. SCOTLAND: 10½d. to 1s. 0½d., containers extra and returnable.

AMMONIA, LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb., d/d.

AMMONIUM CARBONATE.—£20 per ton d/d in 5 cwt. casks.

AMMONIUM CHLORIDE.—Grey galvanising, £19 per ton, ex wharf.

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Salammoniac.)

AMMONIUM DICHROMATE.—8¼d. per lb. d/d U.K.

ANTIMONY OXIDE.—£68 per ton.

ARSENIC.—Continental material £11 per ton c.i.f., U.K. ports; Cornish White, £12 5s. to £12 10s. per ton f.o.r., mines, according to quantity. MANCHESTER: White powdered Cornish, £16 10s. per ton, ex store.

BARIUM CHLORIDE.—£11 10s. to £12 10s. per ton in casks ex store. GLASGOW: £11 10s. per ton.

BLEACHING POWDER.—Spot, 35/37%, £9 15s. per ton in casks, special terms for contracts. SCOTLAND: £9 per ton net ex store.

BORAX COMMERCIAL.—Granulated, £16 per ton; crystal, £17; powdered, £17 10s.; extra finely powdered, £18 10s., packed in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots. GLASGOW: Granulated, £16, crystal, £17; powdered, £17 10s. per ton in 1-cwt. bags, carriage paid.

BORIC ACID.—Commercial granulated, £28 10s. per ton; crystal, £29 10s.; powdered, £30 10s.; extra finely powdered, £32 10s. in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots. GLASGOW: Crystals, £29 10s.; powdered, £30 10s. 1-cwt. bags in 1-ton lots.

CALCIUM BISULPHITE.—£6 10s. per ton f.o.r. London.

CHARCOAL, LUMP.—£6 to £6 10s. per ton, ex wharf. Granulated, £7 to £9 per ton according to grade and locality.

CHROMETAN.—Crystals, 2¼d. per lb.; liquor, £19 10s. per ton d/d. station in drums. GLASGOW: 70/75% solid, £5 15s. per ton net ex store.

CHROMIC ACID.—9½d. per lb., less 2½%; d/d U.K.

CHROMIUM OXIDE.—11d. per lb.; d/d U.K.

CITRIC ACID.—1s. 0½d. per lb. MANCHESTER: 1s. 0½d. SCOTLAND: B.P. crystals, 1s. 0½d. per lb.; less 5%, ex store.

COPPER SULPHATE.—£21 7s. 6d. per ton, less 2% in casks. MANCHESTER: £19 per ton f.o.b. SCOTLAND: £19 15s. per ton, less 5%, Liverpool, in casks.

CREAM OF TARTAR.—100%, 92s. per cwt., less 2½%. GLASGOW: 99%, £4 12s. per cwt. in 5-cwt. casks.

FORMALDEHYDE.—£20-£22 per ton.

FORMIC ACID.—85%, in carboys, ton lots, £42 to £47 per ton.

GLYCERINE.—Chemically pure, double distilled, 1.260 s.g., in tins, £4 17s. 6d. to £5 17s. 6d. per cwt. according to quantity; in drums, £4 10s. 6d. to £5 3s. 6d.

HYDROCHLORIC ACID.—Spot, 5s. 6d. to 8s. carboy d/d according to purity, strength and locality.

IODINE.—Resublimed B.P., 6s. 4d. per lb. in 7 lb. lots.

LACTIC ACID.—(Not less than ton lots) Dark, 50% by volume, £21 10s.; by weight, £27 10s.; Pale, 50% by volume, £27; by weight, £32 per ton. LANCASHIRE: Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; 80% by weight, £50; pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £55; edible, 50%, by vol., £41. One-ton lots ex works, barrels free.

LEAD ACETATE.—LONDON: White, £31 10s. ton lots; brown, £35. GLASGOW: White crystals, £31 10s.; brown, £1 per ton less. MANCHESTER: White, £33; brown, £32.

LEAD, NITRATE.—£32 per ton for 1-ton lots.

LEAD, RED.—£32 15s. 0d. 10 cwt. to 1 ton, less 2½% carriage paid. SCOTLAND: £32 per ton, less 2½% carriage paid for 2-ton lots.

LITHARGE.—SCOTLAND: Ground, £32 per ton, less 2½%, carriage paid for 2-ton lots.

MAGNESITE.—SCOTLAND: Ground calcined, £9 per ton, ex store.

MAGNESIUM CHLORIDE.—SCOTLAND: £7 10s. per ton.

MAGNESIUM SULPHATE.—Commercial, £5 10s. per ton, ex wharf.

MERCURY.—Ammoniated B.P. (white precip.), lump, 5s. 11d per lb.; powder B.P., 6s. 1d.; bichloride B.P. (corros. sub.) 5s. 2d.; powder B.P. 4s. 10d.; chloride B.P. (calomel), 5s. 11d.; red oxide cryst. (red precip.), 7s.; levig. 6s. 6d.; yellow oxide B.P. 6s. 4d.; persulphate white B.P.C., 6s. 1d.; sulphide black (hyd. sulph. cum sulph. 50%), 6s. For quantities under 112 lb., 1d. extra; under 28 lb., 5d. extra.

METHYLATED SPIRIT.—61 O.P. industrial, 1s. 5d. to 2s. per gal.; pyridinised industrial, 1s. 7d. to 2s. 2d.; mineralised, 2s. 6d. to 3s. Spirit 64 O.P. is 1d. more in all cases and the range of prices is according to quantities. SCOTLAND: Industrial 64 O.P., 1s. 9d. to 2s. 4d.

NITRIC ACID.—Spot, £17 to £30 per ton according to strength and destination.

OXALIC ACID.—£48 15s. to £57 10s. per ton, according to packages and position. GLASGOW: £2 9s. per cwt. in casks. MANCHESTER: £49 to £54 per ton ex store.

PARAFFIN WAX.—SCOTLAND: 3¾d. per lb.

POTASH CAUSTIC.—Solid, £35 5s. to £36 15s. per ton for 2-ton lots ex store; broken, £42 per ton. MANCHESTER: £39.

POTASSIUM CHLORATE.—£36 7s. 6d. per ton. GLASGOW: 4¼d. per lb. MANCHESTER: £37 10s. per ton.

POTASSIUM DICHROMATE.—5½d. per lb. carriage paid. SCOTLAND: 5¼d. per lb., net, carriage paid.

POTASSIUM IODIDE.—B.P. 5s. 6d per lb. in 7 lb. lots.

POTASSIUM NITRATE.—Small granular crystals, £24 to £27 per ton ex store, according to quantity. GLASGOW: Refined granulated, £29 per ton c.i.f. U.K. ports. Spot, £30 per ton ex store.

POTASSIUM PERMANGANATE.—LONDON: 9¾d. per lb. SCOTLAND: B.P. Crystals, 9¾d. MANCHESTER: B.P. 10¾d. to 1s.

POTASSIUM PRUSSIATE.—6½d. per lb. SCOTLAND: 7d. net, in casks, ex store. MANCHESTER: Yellow, 6½d.

SALAMMONIAC.—Firsts lump, spot, £42 17s. 6d. per ton, d/d address in barrels. Dog-tooth crystals, £36 per ton; fine white crystals, £18 per ton, in casks, ex store. GLASGOW: Large crystals, in casks, £37 10s.

SALT CAKE.—Unground, spot, £3 10s. 6d. per ton.

SODA ASH.—58% spot, £5 17s. 6d. per ton f.o.r. in bags.

SODA, CAUSTIC.—Solid, 76/77° spot, £14 per ton d/d station. SCOTLAND: Powdered 98/99%, £18 10s. in drums, £19 5s. in casks, Solid 76/77° £15 12s. 6d. in drums; 70/73%, £15 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts, 10s. per ton less.

SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

SODIUM ACETATE.—£19-£20 per ton carriage paid North. GLASGOW: £18 10s. per ton net ex store.

SODIUM BICARBONATE.—Refined spot, £10 15s. per ton d/d station in bags. GLASGOW: £13 5s. per ton in 1 cwt. kegs, £11 5s. per ton in 2-cwt. bags. MANCHESTER: £10 10s.

SODIUM BISULPHITE POWDER.—60/62%, £20 per ton d/d 1 cwt. iron drums for home trade.

SODIUM CARBONATE MONOHYDRATE.—£20 per ton d/d in minimum ton lots in 2 cwt. free bags.

SODIUM CHLORATE.—£27 10s. to £32 per ton. GLASGOW: £1 11s. per cwt., minimum 3 cwt. lots.

SODIUM DICHROMATE.—Crystals cake and powder 4¼d. per lb. net d/d U.K. with rebates for contracts. MANCHESTER: 4d. per lb. GLASGOW: 4¼d. net, carriage paid.

SODIUM CHROMATE.—4½d. per lb. d/d U.K.

SODIUM HYPOSULPHITE.—Pea crystals, £14 10s. per ton for 2-ton lots; commercial, £11 5s. per ton. MANCHESTER: Commercial, £11; photographic, £15 10s.

SODIUM METASILICATE.—£14 5s. per ton, d/d U.K. in cwt. bags.

SODIUM NITRATE.—Refined, £8 per ton for 6-ton lots d/d. GLASGOW: £1 12s. 0d. per cwt. in 1-cwt. kegs, net, ex store.

SODIUM NITRITE.—£18 5s. per ton for ton lots.

SODIUM PERBORATE.—10%, 9½d. per lb. d/d in 1-cwt. drums.

SODIUM PHOSPHATE.—Di-sodium, £12 per ton delivered for ton lots. Tri-sodium, £15 to £16 per ton delivered per ton lots.

SODIUM PRUSSIATE.—5d. per lb. for ton lots. GLASGOW: 5d. to 5¾d. ex store. MANCHESTER: 4¼d. to 5d.

SODIUM SILICATE.—£9 10s. per ton.

SODIUM SULPHATE (GLAUBER SALTS).—£3 per ton d/d.

SODIUM SULPHATE (SALT CAKE).—Unground spot, £3 to £3 10s. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANCHESTER: £3 12s. 6d.

SODIUM SULPHIDE.—Solid 60/62%, Spot, £11 15s. per ton d/d in drums; crystals, 30/32%, £9 per ton d/d in casks. MANCHESTER: Concentrated solid, 60/62%, £11; commercial, £8 10s.

SODIUM SULPHITE.—Pea crystals, spot, £14 10s. per ton d/d station in kegs.

SULPHUR PRECIP.—B.P., £55 to £60 per ton according to quantity. Commercial, £50 to £55.

SULPHURIC ACID.—168° Tw., £4 11s. to £5 1s. per ton; 140° Tw., arsenic-free, £3 to £3 10s.; 140° Tw., arsenious, £2 10s.

TARTARIC ACID.—1s. 1½d. per lb. less 5%, carriage paid for lots of 5 cwt. and upwards. MANCHESTER: 1s. 1½d. per lb. GLASGOW: 1s. 1d. per lb., 5%, ex store.

WHITE SUGAR OF LEAD.—£31 10s. per ton net.

ZINC SULPHATE.—Tech., £11 10s. f.o.r., in 2 cwt. bags.

Rubber Chemicals

ANTIMONY SULPHIDE.—Golden, 7d. to 1s. 2d. per lb., according to quality. Crimson, 1s. 6d. to 1s. 7½d. per lb.

ARSENIC SULPHIDE.—Yellow, 1s. 5d. to 1s. 7d. per lb.

BARYTES.—£6 to £6 10s. per ton, according to quality.

CADMIUM SULPHIDE.—7s. to 7s. 3d. per lb.

CARBON BLACK.—4¾d. per lb., ex store.

CARBON DISULPHIDE.—£31 to £33 per ton, according to quantity, drums extra.

CARBON TETRACHLORIDE.—£41 to £46 per ton, according to quantity, drums extra.

CHROMIUM OXIDE.—Green, 10¼d. to 11d. per lb.

DIPHENYLGUANIDINE.—2s. 2d. per lb.

INDIA-RUBBER SUBSTITUTES.—White, 4¾d. to 5¼d. per lb.; dark 4d. to 4½d. per lb.

LAMP BLACK.—£24 to £26 per ton del., according to quantity. Vegetable black, £35 per ton upwards.

LEAD HYPOSULPHITE.—9d. per lb.

LITHOPONE.—30%, £16 10s. to £17 5s. per ton.

SULPHUR.—£9 to £9 5s. per ton. SULPHUR PRECIP. B.P., £55 to £60 per ton. SULPHUR PRECIP. COMM., £50 to £55 per ton.

SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quantity.

VERMILION.—Pale, or deep, 5s. per lb., 1-cwt. lots.

ZINC SULPHIDE.—£58 to £60 per ton in casks ex store, smaller quantities up to 1s. per lb.

Nitrogen Fertilisers

AMMONIUM SULPHATE.—The following prices have been announced for neutral quality basis 20.6% nitrogen, in 6-ton lots delivered farmer's nearest station up to June 30, 1938: November, £7 8s.; December, £7 9s. 6d.; January, 1938, £7 11s.; February, £7 12s. 6d.; March/June, £7 14s.

CALCIUM CYANAMIDE.—The following prices are for delivery in 5-ton lots, carriage paid to any railway station in Great Britain up to June 30, 1938: November, £7 10s.; December, £7 11s. 3d.; January, 1938, £7 12s. 6d.; February, £7 13s. 9d.; March, £7 15s.; April/June, £7 16s. 3d.

NITRO CHALK.—£7 10s. 6d. per ton up to June 30, 1938.

SODIUM NITRATE.—£8 per ton for delivery up to June 30, 1938.

CONCENTRATED COMPLETE FERTILISERS.—£11 4s. to £11 13s. per ton in 6-ton lots to farmer's nearest station.

AMMONIUM PHOSPHATE FERTILISERS.—£10 19s. 6d. to £14 16s. 6d. per ton in 6-ton lots to farmer's nearest station.

Coal Tar Products

BENZOL.—At works, crude, 9½d. to 10d. per gal.; standard motor, 1s. 3d. to 1s. 3½d.; 90%, 1s. 4d. to 1s. 4½d.; pure, 1s. 8d. to 1s 8½d. GLASGOW: Crude, 10d. to 10½d. per gal.; motor, 1s. 4d. to 1s. 4½d

CARBOLIC ACID.—Crystals, 7¾d. to 8¼d. per lb., small quantities would be dearer; Crude, 60's, 3s. 9d. to 4s.; dehydrated, 4s. 4½d. to 4s. 7½d. per gal. MANCHESTER: Crystals, 9d. per lb. f.o.b. in drums; crude, 4s. per gal. GLASGOW: Crude, 60's, 4s. 3d. to 4s. 6d. per gal.; distilled, 60's.

CREOSOTE.—Home trade, 6¼d. to 6½d. per gal., f.o.r. makers' works; exports, 6¾d. to 6¾d. per gal., according to grade. MANCHESTER: 5¼d. to 6¼d. GLASGOW: B.S.I. Specification, 6d. to 6¼d. per gal.; washed oil, 5d. to 5¼d.; lower sp. gr. oils, 5¾d. to 6¼d.

CRESYLIC ACID.—97/99%, 3s. 6d. to 3s. 9d.; 99/100%, 4s. to 5s. 6d. per gal., according to specification; Pale, 99/100%, 3s. 10d. to 4s. 1d.; Dark, 95%, 3s. 2d. to 3s. 3d. per gal. GLASGOW: Pale, 99/100%, 5s. to 5s. 6d. per gal.; pale, 97/99%, 4s. 6d. to 4s. 10d., dark, 97/99%, 4s. 3d. to 4s. 6d.; high boiling acids, 2s. to 2s. 6d. American specification, 3s. 9d. to 4s. MANCHESTER: Pale, 99/100%, 4s.

NAPHTHA.—Solvent, 90/160, 1s. 6¼d. to 1s. 7¼d. per gal.; solvent, 95/160%, 1s. 7d. to 1s. 8d., naked at works; heavy 90/190%, 1s. 1¼d. to 1s. 3d. per gal., naked at works, according to quantity. GLASGOW: Crude, 6¼d. to 7¼d. per gal.; 90%, 160, 1s. 5d. to 1s. 6d., 90%, 190, 1s. 1d. to 1s. 3d.

NAPHTHALENE.—Crude, whizzed or hot pressed, £7 to £8 per ton; purified crystals, £16 per ton in 2-cwt. bags. LONDON: Fire lighter quality, £5 10s. to £7 per ton. GLASGOW: Fire lighter, crude, £6 to £7 per ton (bags free). MANCHESTER: Refined, £17 per ton f.o.b.

PITCH.—Medium, soft, 35s. to 37s. per ton, f.o.b. MANCHESTER: 33s. f.o.b., East Coast. GLASGOW: f.o.b. Glasgow, 35s. to 37s. per ton; in bulk for home trade, 35s.

PYRIDINE.—90/140%, 13s. 6d. to 15s. per gal.; 90/160%, 11s. to 13s. 6d. per gal.; 90/180%, 3s. 3d. to 3s. 9d. per gal. f.ob. GLASGOW: 90% 140, 10s. to 12s. per gal.; 90% 160, 9s. to 10s.; 90% 180, 2s. 6d. to 3s. MANCHESTER: 12s. 6d. to 14s. per gal.

TOLUOL—90%, 1s. 10½d. to 1s. 11½d. per gal.; pure, 2s. 3d½. to 2s. 4½d. GLASGOW: 90%, 120, 1s. 10d. to 2s. 1d. per gal.

XYLOL.—Commercial, 2s. 2d. per gal.; pure, 2s. 4d. GLASGOW: Commercial, 2s. to 2s. 1d. per gal.

Wood Distillation Products

CALCIUM ACETATE.—Brown, £7 10s. to £8 per ton; grey, £9 10s. to £10. Liquor, brown, 30° Tw., 6d. to 8d. per gal. MANCHESTER: Brown, £9 10s.; grey, £11 10s.

METHYL ACETONE.—40.50%, £35 to £40 per ton.

WOOD CREOSOTE.—Unrefined, 4d. to 8d. per gal., according to boiling range.

WOOD NAPHTHA, MISCIBLE.—3s. 3d. to 3s. 6d. per gal.; solvent, 3s. 6d. to 3s. 9d. per gal.

WOOD TAR.—£2 to £8 per ton, according to quality.

Intermediates and Dyes

ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.

ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.

BENZIDINE, HCl.—2s. 7½d. per lb., 100% as base, in casks.

BENZOIC ACID, 1914 B.P. (ex toluol).—1s. 11d. per lb. d/d buyer's works.

m-CRESOL 98/100%.—1s. 8d. to 1s. 9d. per lb. in ton lots.

o-CRESOL 30/31° C.—6½d. to 7½d. per lb. in 1-ton lots.

p-CRESOL, 34-5° C.—1s. 7d. to 1s. 8d. per lb. in ton lots.

DICHLORANILINE.—2s. 1½d. to 2s. 5½d. per lb.

DIMETHYLANILINE.—Spot, 1s. 7½d. per lb., package extra.

DINITROBENZENE.—8½d. per lb.

DINITROCHLORBENZENE, SOLID.—£79 5s. per ton.

DINITROTOLUENE.—48/50° C., 9½d. per lb.; 66/68° C., 11d.

DIPHENYLAMINE.—Spot, 2s. 2d. per lb., d/d buyer's works.

GAMMA ACID, Spot, 4s. 4½d. per lb. 100% d/d buyer's works.

H ACID.—Spot, 2s. 7d. per lb.; 100% d/d buyer's works.

NAPHTHIONIC ACID.—1s. 10d. per lb.

β-NAPHTHOL.—£97 per ton; flake, £94 8s. per ton.

α-NAPHTHYLAMINE.—Lumps, 1s. 1d. per lb.

β-NAPHTHYLAMINE.—Spot, 3s. per lb.; d/d buyer's works.

NEVILLE AND WINTHER'S ACID.—Spot, 3s. 3½d. per lb. 100%.

o-NITRANILINE.—4s. 3½d. per lb.

m-NITRANILINE.—Spot, 2s. 10d. per lb. d/d buyer's works.

p-NITRANILINE.—Spot, 1s. 10d. to 2s. 3½d. per lb. d/d buyer's works.

NITROBENZENE.—Spot, 4½d. to 5d. per lb., in 90-gal. drums, drums extra. 1-ton lots d/d buyer's works.

NITRONAPHTHALENE.—10½d. per lb.; P.G., 1s. 0½d. per lb.

SODIUM NAPHTHIONATE.—Spot, 1s. 11d. per lb.; 100% d/d buyer's works.

SULPHANILIC ACID.—Spot, 8¾d. per lb. 100%, d/d buyer's works.

o-TOLUIDINE.—11½d. per lb., in 8/10-cwt. drums, drums extra.

p-TOLUIDINE.—2s. per lb., in casks.

m-XYLIDINE ACETATE.—4s. 8d. per lb., 100%.

Latest Oil Prices

LONDON, Feb. 2.—LINSEED OIL was steady. Spot, £29 15s. per ton (small quantities), Feb., £27 5s.; March-April, £27 7s. 6d.; May-Aug., £27 10s.; Sept.-Dec., £27 15s.; naked. SOYA BEAN OIL was quiet. Oriental, spot, ex tank, Rotterdam, £19 10s. per ton. RAPE OIL was slow. Crude extracted, £35 10s. per ton; technical refined, £36, naked, ex wharf. COTTON OIL was easier. Egyptian crude, £18 10s. per ton; refined common edible, £22; deodorised, £24, naked, ex mill (small lots, £1 10s. extra). TURPENTINE was dearer. American spot, 32s. 6d. per cwt.; Feb.-April delivery, 33s. 3d.

HULL.—LINSEED OIL.—Spot quoted £28 2s. 6d. per ton; Feb.-April to May-August, £27 10s.; Sept.-Dec., £27 15s. COTTON OIL.—Egyptian, crude, spot, £18 per ton; edible, refined, spot, £21; technical, spot, £21; deodorised, £23, naked. PALM KERNEL OIL.—Crude, f.m.q., spot, £21 per ton, naked GROUNDNUT OIL.—Extracted, spot, £23 10s. per ton; deodorised, £26 10s. RAPE OIL.—Extracted, spot, £34 10s. per ton; refined, £35 10s. SOYA OIL.—Extracted, spot, £22 10s. per ton; deodorised, £25 10s. COD OIL.—F.o.r. or f.a.s., 27s. 6d. per cwt., in barrels. CASTOR OIL.—Pharmaceutical, 42s. 6d. per cwt.; first, 37s. 6d.; second, 35s. 6d. TURPENTINE.—American, spot, 34s. 9d. per cwt.